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NATIONAL SEARCH AND RESCUE MANUAL. ADDENDUM.(U)
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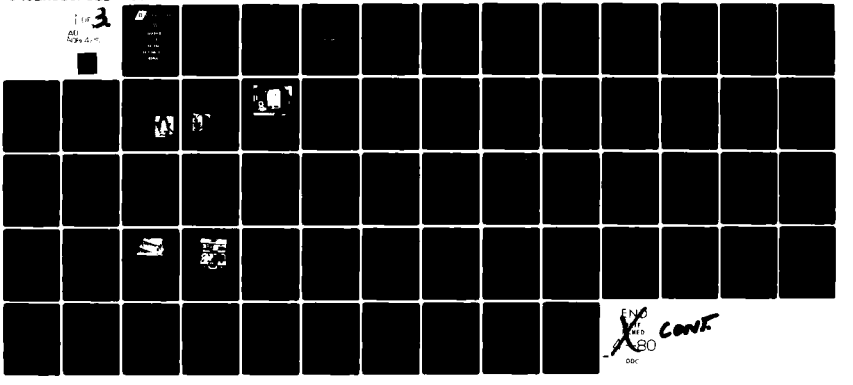

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COAST GUARD

ADDENDUM TO THE NATIONAL SEARCH AND RESCUE MANUAL

REPRINT WITH AMENDMENTS
1 THROUGH 11 INCLUDED

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This publication supplements the National SAR Manual by providing those procedures which are intended for Coast Guard only use. Major Topics discussed are:

1. Aerial delivery procedures;
2. Small craft search patterns;
3. Towing and salvage;
4. Coast Guard policy on liability releases in assistance cases
5. SAR Case Studies;
6. SAR Coordination;
7. RCC Controller Training;
8. SAR operating restrictions for harbor tugs;
9. Underwater location of crashed aircraft;
10. Emergency Medical Service (~~EMS~~);
11. Rescue by Marine Craft

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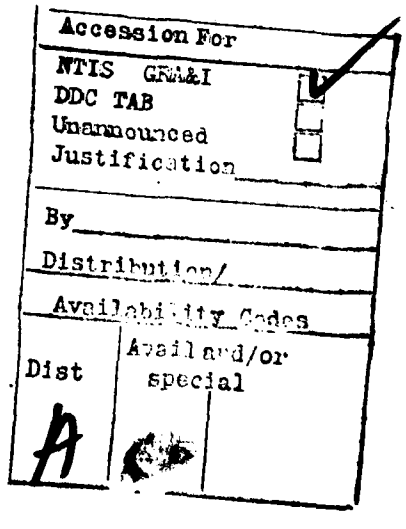
CG 308 (CG Add)

U.S. COAST GUARD ADDENDUM

TO

THE NATIONAL SAR MANUAL



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DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
U.S. COAST GUARD (G-OSR-4)
WASHINGTON, D.C. 20590
PHONE: (202) 426-1933

U. S. COAST GUARD ADDENDUM TO
THE NATIONAL SEARCH AND RESCUE MANUAL
CG-308

AUG 12 1978

LETTER OF PROMULGATION

1. Purpose. The Coast Guard Addendum to the National Search and Rescue Manual (CG-308) is hereby promulgated for the guidance of U. S. Coast Guard forces participating in search and rescue (SAR) operations. The Addendum provides procedures which are intended for Coast Guard use only.

2. Cancellation. Letter of Promulgation of the U. S. Coast Guard Addendum to CG-308 of 15 July 1976.

3. Policy. Procedures, techniques, and terminology herein have been adopted for use by the Coast Guard when conducting search and rescue operations. All procedures, techniques, and terminology promulgated by the basic National SAR Manual, CG-308, shall also be considered fully applicable to Coast Guard forces. However, because of the many variables encountered in SAR operations, the procedures and techniques of the basic Manual and this Addendum should be tempered with judgement, having due regard for conditions existing at the time which may require deviation and resourcefulness.

4. Discussion. When procedures presently incorporated in this Addendum are approved for joint use, they will be published in the basic Manual and deleted from the Addendum. This Addendum is issued as a publication separate from the basic Manual.

5. Changes. Serially numbered changes to the Addendum will be issued from time to time. Recommendations for changes are encouraged and should be addressed to the Commandant (G-OSR-4).

207751

C. C. HOBDY, Jr.
Acting Chief, Office of Operations

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Section 1. AERIAL DELIVERY PROCEDURES

0100 Aerial Delivery Procedures, General Considerations

The standard procedures for aerial delivery contained in this section apply to Coast Guard day and night SAR operations over water, and if the need arises, for operations over land. Mobility of personnel on the land generally makes possible the recovery of equipment dropped some distance away, but air drops to survivors at sea require a high degree of accuracy. The patterns described in this section were developed to eliminate as many variables as possible. Thorough training of SAR aircrews in the use of these procedures is required. Aircraft commanders may deviate from these procedures when such action will more effectively accomplish the mission.

0105 Aerial Delivery Operations by Fixed Wing Aircraft

Prior to commencing the patterns, complete the applicable aircraft descent and landing check lists, except as follows:

HC–130—Landing gear up, flaps 50%,

HU–16—Landing gear up, flaps 15 degrees, 2300 RPM.

If an aborted drop or delay is necessary, execute another full pattern prior to making the drop. The aircraft commander must thoroughly brief his crew prior to commencing the drop pattern. A trail line assembly shall be utilized on all free fall drops over water.

The minimum drop pattern altitude shall be 200 feet above the surface except when a higher altitude is necessary to provide adequate clearance over obstacles. In the absence of a firm visual reference and accurate altitude information, the minimum pattern altitude shall be increased as necessary to insure safe flight. Under daytime VFR, and non-glassy water conditions, free-fall drops may be made at an altitude not less than 50 feet above the surface at the discretion of the aircraft commander. Standard pattern airspeed shall be:

HC–130—130 knots IAS or 1.3 Vs, whichever is greater.

HU–16—105 knots IAS or 1.3 Vs, whichever is greater.

0110 Sea Rescue Kit Delivery Pattern (See Figure 1)

The drop course is perpendicular to the wind line. If the survivors are in a raft, the sea rescue kit should be dropped downwind since the survivors' raft will drift faster. If the survivors are in the water, the sea rescue kit should be dropped upwind since the kit will drift faster than the survivors. After determining whether to drop upwind or downwind of the target, maneuver the aircraft on the reciprocal of the drop heading to pass approximately 50 feet abeam of the target. Three seconds after passing the target, drop a drift signal. Continue heading for 15 seconds and drop a second drift signal; then make a 40 degree standard rate turn to the right. After 15 seconds, make a standard rate 180 degree turn to the left, maintain heading until final turn to the drop heading so as to pass approximately 50 feet upwind of the target for upwind drop, or 50 feet downwind for downwind drop. For upwind drops, with surface winds in excess of 15 knots, increase upwind distance 25 feet for each additional 10 knots of wind. After rolling out on final heading, advise dropmaster, THIRTY SECONDS STANDBY. When abeam second drift signal dropped advise the dropmaster, FIFTEEN SECONDS STANDBY. When directly upwind (or downwind) of the first drift signal, advise the dropmaster, DROP. If for any reason drop can not be made, remain silent, add power, and go around. The addition of climb power cancels

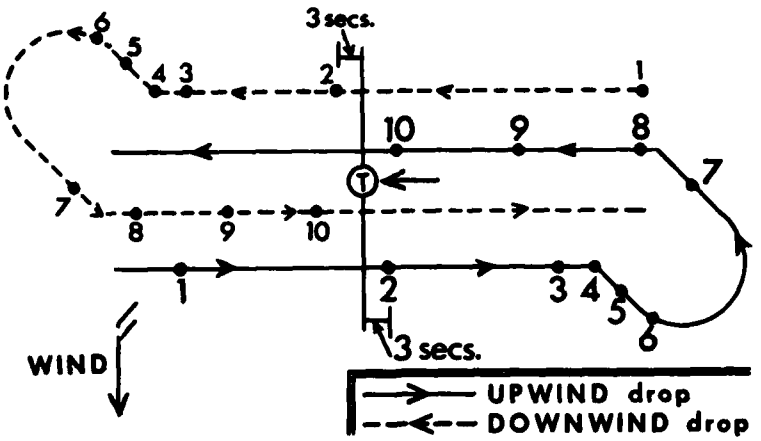


FIGURE 1

STANDARD DROP PATTERN FOR SEA RESCUE KIT

1. Maneuver aircraft crosswind on reciprocal of drop heading.
2. Three seconds after passing abeam target, drop first drift signal.
3. Maintain heading for 15 seconds and drop second drift signal.
4. Turn right 40 degrees.
5. Maintain heading for 15 seconds.
6. Make 180 degree left standard rate turn.
7. Maintain head until final turn to pass proper distance from target.
8. Advise THIRTY SECONDS STANDBY.
9. Advise FIFTEEN SECONDS STANDBY.
10. Command DROP when directly abeam first drift signal.

the run, and this must be clearly understood by all hands.

0115 Free Fall Delivery Pattern (See Figure 2)

Maneuver the aircraft to pass directly over the target into the wind. When over the target make a 180 degree standard rate turn to the left, fly downwind for 30 seconds and make another 180 degree standard rate turn to the left rolling out of the turn directly downwind from the target and advise the dropmaster, THIRTY SECONDS STANDBY. When approximately 15 seconds from the target advise the dropmaster, FIFTEEN SECONDS STANDBY. At drop point, advise the dropmaster, DROP. If for any reason the drop can not be made, remain silent, add power, and go around. To drop downwind of target, pattern should still be flown into the wind but the drop made earlier.

The use of a trail line assembly when delivering free fall equipment is highly recommeded. However, DO NOT STREAM THE TRAIL LINE because either personnel injury or damage to the aircraft/drop equipment could result when the two sea anchors/drogues from the assembly enter the wind stream and deploy.

0120 Dropping Datum Marker Buoys (T–981/SRT)

A trail line is not normally attached to the datum marked buoy (T–981/SRT) before free fall dropping. These buoys may be free fall dropped:

a. From below 200 feet at ground speeds up to 65 knots.

b. Between 200 feet and 500 feet at ground speeds between 65 kts and 130 knots.

c. NOT above 500 feet or 130 knots.

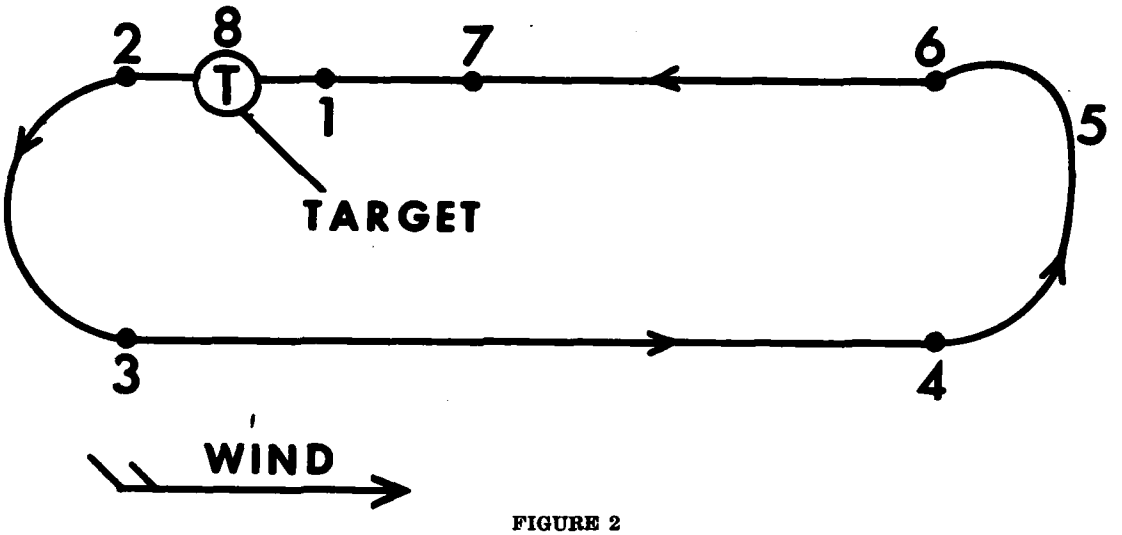


FIGURE 2

STANDARD DROP PATTERN FOR FREE FALL DELIVERY

(Upwind Drop Depicted)

1. Maneuver aircraft over target into wind.
2. Commence left standard rate turn.
3. Fly downwind 30 seconds.
4. Commence left standard rate turn.
5. Adjust turn to roll out directly downwind of target.
6. Advise THIRTY SECONDS STANDBY.
7. Advise FIFTEEN SECONDS STANDBY.
8. Command—DROP.

0125 Parachute Delivery Pattern (See Figure 3)

This pattern is applicable for delivery of dewatering pumps, medical supplies, or any other equipment packaged for delivery with a parachute attached. Maneuver the aircraft to pass directly over the target into the wind. Prepare equipment package, and assemble aerial delivery platform if applicable. In HU–16 aircraft, attach the parachute static line to the aft rescue platform rigging eye. When over the target make a 180 degree standard rate turn to the left, fly downwind for 30 seconds and make another 180 degree standard rate turn to the left rolling out of the turn directly downwind from the target and advise the dropmaster, THIRTY SECONDS STANDBY. When approximately 15 seconds from the target advise the dropmaster, FIFTEEN SECONDS STANDBY. At the drop point advise the dropmaster, DROP. Under no-wind conditions, drop when directly over the target. Correct for any wind present by delaying the drop a sufficient amount of time to compensate for the wind.

0130 Warning

OCCASIONALLY A PARACHUTE FAILS TO OPEN. DROPS SHOULD ALWAYS BE PLANNED SO THAT, IN THE EVENT OF A PARACHUTE FAILURE, THE TRAJECTORY OF THE OBJECT WILL CLEAR THE TARGET.

0135 Survivor Relocation Pattern (See Figure 4)

The patterns previously described are based on the assumption that the target, be it a person or a vessel, will be visible to the aircraft upon reaching the target area. In some instances however, a search may be required to find the target and, when found, the target must be accurately marked, either for equip-

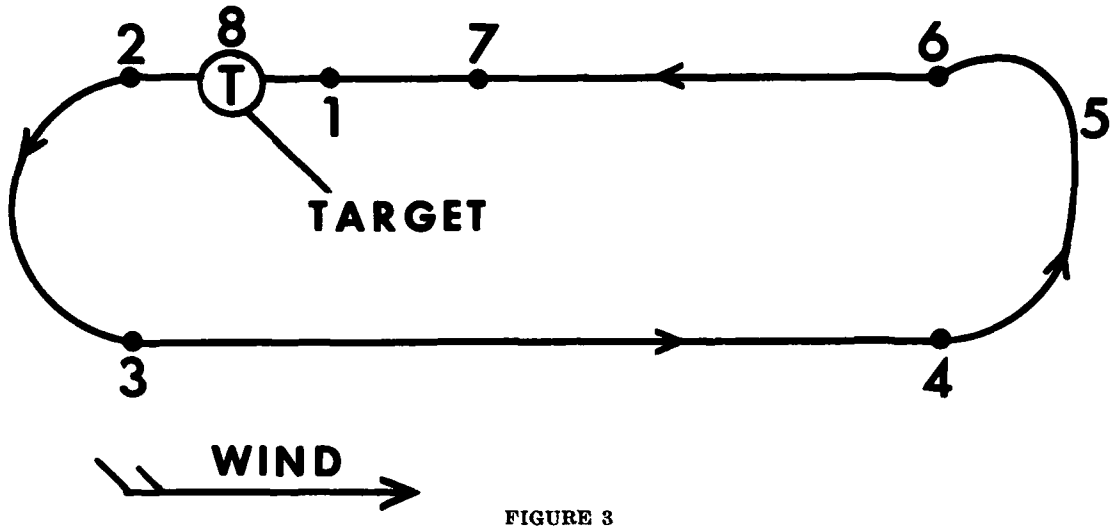


FIGURE 3

STANDARD DROP PATTERN FOR PARACHUTE DELIVERY

1. Maneuver aircraft over target into wind.
2. Commence left standard rate turn.
3. Fly downwind 30 seconds.
4. Commence left standard rate turn.
5. Adjust turn to roll out directly downwind of target.
6. Advise THIRTY SECOND STANDBY.
7. Advise FIFTEEN SECOND STANDBY.
8. DROP.

Command—DROF as follows:

Wind Force	*Position*
a. 0 knots	Over vessel
b. 10 "	1 second past vessel
c. 20 "	2 seconds past vessel
d. 30 "	3 seconds past vessel

(etc)

ment drop, or to await the arrival of surface units. The most difficult target to locate is a survivor in the water.

The aircraft should be in the basic search configuration, and the lookouts briefed to launch a drift signal immediately upon any crewmember reporting a sighting. After launch of a drift signal, the elapsed time clock is started and the pilot notes and maintains heading, altitude and airspeed. Fifteen seconds after the first drift signal is launched, launch another. The pilot then makes a procedure turn to the right, adjusting the final portion of the turn to roll out on a heading that will allow the aircraft to line up with, and fly directly over, the two drift signals. When over the first drift signal launched, launch a smoke float. This smoke float should land very close to the target position. If a delay is involved between the time of the sighting and the time that the first drift signal is launched, delay an equal amount of time after passing back over the first drift signal before launching the smoke float. If the target is not resighted at this time, maintain heading for 30 seconds and launch another drift signal. A search with legs parallel to the line of markers usually relocates the target.

0140 General Information Concerning Helicopter Operations

Due to the greater mobility of rotary wing aircraft and their ability to hover, aerial delivery operations by a helicopter can be more precise than those conducted by fixed wing aircraft.

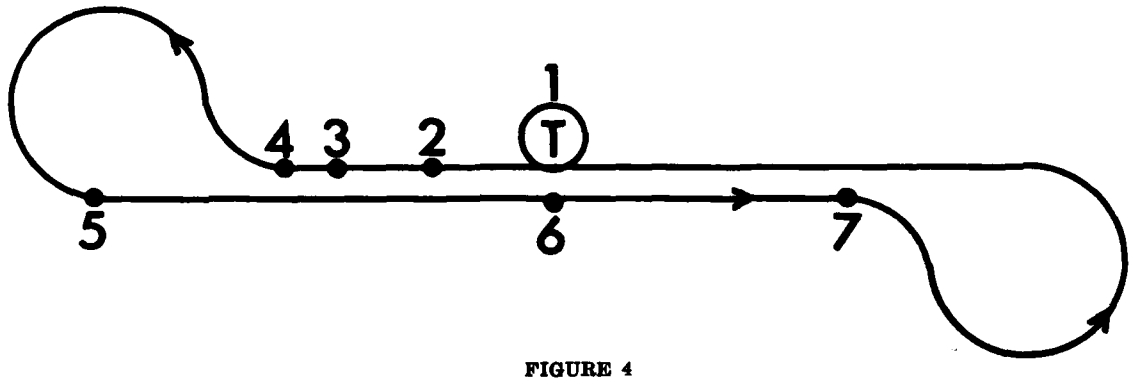


FIGURE 4

STANDARD PATTERN FOR RELOCATING SURVIVORS

1. Initial sighting—Drop drift signal.
2. Maintain heading, altitude, airspeed for 15 seconds.
3. Drop drift signal.
4. Make procedure turn to the right.
5. Make final turn to fly reciprocal track over markers.
6. When over marker #1, drop smoke float.
7. If target is not re-sighted, maintain heading for 30 seconds and drop a drift signal. Continue search utilizing the line of markers for reference.

Information concerning standard operating procedures and crew duties during hoist and aerial delivery operations are contained in the Flight Manual of each type of helicopter.

0145 Static Electricity Discharge Procedures

A helicopter in flight builds a static charge which must be removed prior to contact between any portion of the helicopter and an individual on the surface. During hoist or aerial delivery operations, the most effective method the hoist operator can employ to ground this electrical charge is to insure that the hoist equipment contacts the water or ground on the approach to the target. The "Dead Man's Stick" can be used by vessel personnel to discharge this electricity.

0150 Warning

WARN INEXPERIENCED PERSONS RECEIVING THE HOIST OF THE DANGER OF ELECTRICAL SHOCK.

0155 Use of the Rescue Sling (Figure 5)

The rescue sling may be used at any time when, in the opinion of the pilot, the use of the basket is inadvisable and the use of a litter is unnecessary. At no time should a survivor

FIGURE 5. Proper use of the Rescue Sling.

be hoisted with the sling unless he has been shown the correct manner in which it is to be donned. This includes the retainer straps being secured firmly around the individual prior to commencing the hoist. Military pilots have been trained in the rescue sling's use and therefore, no problems should be encountered in this respect.

0160 Use of the Rescue Basket (Figure 6)

The rescue basket shall be used in preference to the sling. Particular cases where use of the basket is indicated include:

a. Pick-up from a surface vessel,

b. Whenever the condition of a survivor indicates little or no self-help can be expected, and a platform pickup is infeasible,

c. Whenever injuries, especially of the chest or shoulder area, might be aggravated by use of a sling, or

d. When the person to be hoisted is not apt to be familiar with operation of the sling.

FIGURE 6. Proper use of the Rescue Basket.

0165 Use of the Stokes Litter (Figure 7)

The Stokes Litter should be used only when the condition of the patient is such that he must be in a prone poistion.

Prior to commencing the hoist, the hoist operator will insure that the litter securing straps and chest pad are utilized.

0170 Use of the Hoist for Medical Evacuation From the Surface

Either the rescue basket or Stokes Litter, as appropriate, may be used for hoisting a patient from the surface, or from a surface vessel. If the patient has serious injuries, is unconscious, or is in shock, the Stokes Litter should be used rather than the rescue basket. When possible, and medically indicated, it is preferable to lower a physician, corpsman, or EMT, to examine the patient prior to evacuation by hoisting. When the decision to hoist the patient is made, the vessel should be advised by any available means that the following procedures will be used:

a. If possible, ground the basket/litter, to the vessel prior to personnel touching it.

b. The basket/litter, should be guided to the selected location on deck by the ship's crew, by means of the steadying line.

c. After the basket/litter, is on deck, it should be disconnected from the hoist cable, and the hook and cable guided clear of the rigging while being recovered by the helicopter.

d. The aircraft will move to one side and await the signal from the vessel that the patient is ready to be hoisted.

e. The patient should be made as comfortable as possible, and if conscious, should be informed of the instructions on the illustrated card attached to the basket or litter. If the patient's condition permits, make every effort to insure that the patient is wearing a personal flotation device.

f. Upon signal from the vessel, the aircraft will move back over the vessel and lower the hook, which should then be refastened to the basket/litter.

g. When the vessel is ready for the hoist, a "thumbs up" signal should be given to the aircraft.

h. Vessel personnel should tend the steadying line to prevent swinging.

If a steadying line is not used, eliminate steps b and h. Normally, the rescue basket,

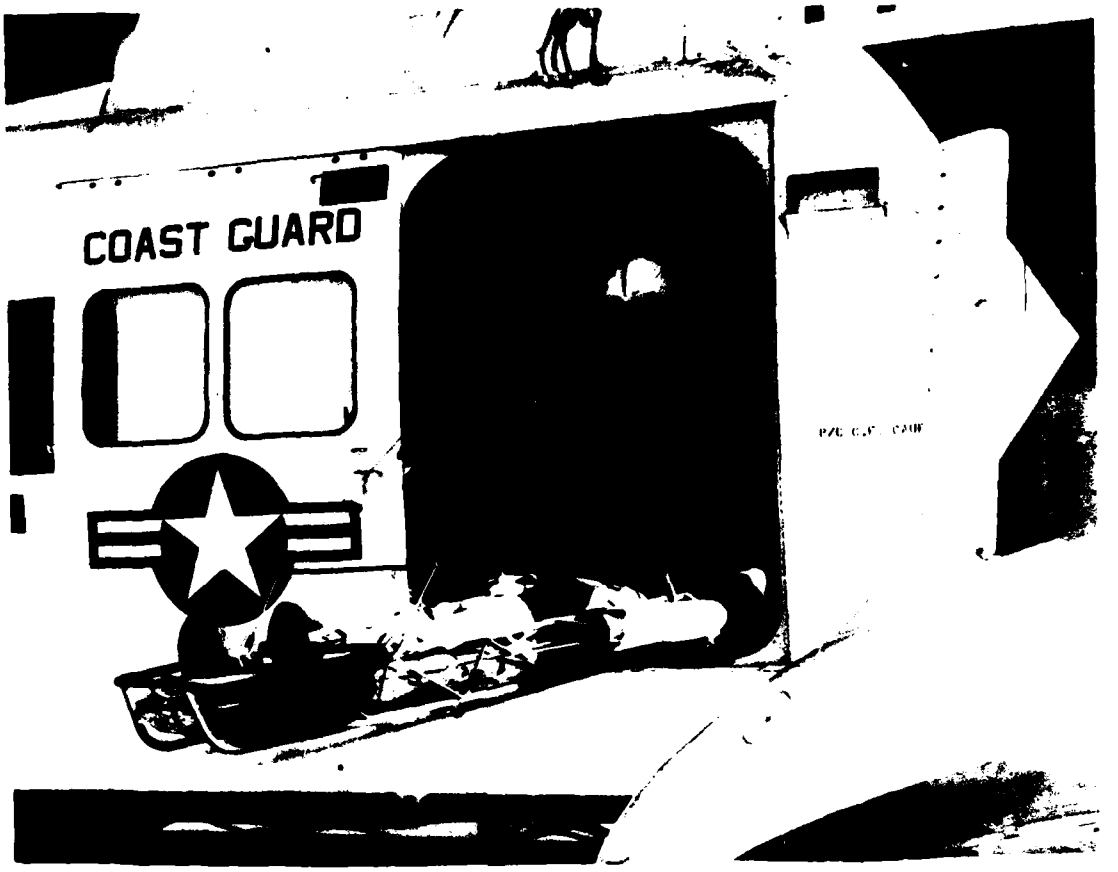


FIGURE 7. Modified Stoke's Litter (Note spreader bars).

or sling, is used for hoisting a person from the water. In this case, the basket or sling is not removed from the hoist and the helicopter remains over the subject while he enters the basket or sling.

0175 Use of the Hoist for Lowering Heavy Objects to the Surface

Any floatable heavy object, such as pump, which may be damaged by free fall, or which requires a high degree of accuracy at delivery point, shall be lowered by use of the hoist. In moderate seaways, the container may be lowered directly to the deck, usually with a steadying line attached. If the vessel is working to any extent in the seaway so that lowering the object directly to the deck could result in damage, the following procedure should be used:

a. Eliminate the weak link from the steadying line.

b. Pass the steadying line to the vessel.

c. Move out to the side and establish a low hover. Attach the other end of the line to the container. From the low hover drop the container into the water beside the vessel.

d. Personnel on the vessel can then retrieve the container.

0180 Internal Communications

All flight crewmembers actively involved in a SAR mission, and especially those concerned with equipment drops or hoisting operations, must be equipped to receive and transmit on the aircraft intercommunications system. All commands should be transmitted over that system. Strict communication discipline must be observed during these operations.

0185 Precautions

Certain hazards to personnel and equipment are inherent in the aerial delivery of equipment. The degree of risk depends largely on the procedures employed, the type of equipment dropped, the state of crew training and flight conditions. Precise crew coordination and discipline, knowledge of and strict adherence to safety precautions and the proper use of equipment are required to minimize the hazards involved. It is incumbent on each command to insure that safety precautions peculiar to each item of equipment are understood and conscientiously observed by all crewmembers. Aircraft commanders must be particularly aware of the following cautions:

a. Disastrous consequences can result from the dropping of equipment directly on personnel or vessels.

b. Under conditions of poor visual reference to the surface (darkness, low visibility or glassy water), utmost care is required to preclude flying the aircraft into the water. At low altitudes, it may be necessary to insure that one pilot is monitoring the flight instruments at all times. In any case, a thorough crew briefing prior to the drop and exacting pilot/copilot coordination are required.

Section 2. SMALL CRAFT SEARCH PATTERNS

0200 Simplified Search Patterns—General Considerations

The search patterns in the National SAR Manual can be used by any unit. However, for boats and small vessels, some patterns may prove too sophisticated. For this reason, the following simplified search patterns have been developed for use by the smaller surface craft. A copy of these pages should be carried in each small craft of the Coast Guard for ready reference.

0205 Determination of Track Spacing

Track spacing (S) will usually be computed by the officer-in-charge of the Coast Guard Station to which the boat is assigned or by the On-Scene Commander. If the person in charge of the boat must decide for himself what track spacing to use, he should use *the following simple rule. Estimate* at what distance you will be able to see the search target and use that distance for track spacing.

0210 Designation of Search Areas

Search areas are designated by any one of the following means:

a. *Geographical Coordinates. In this* method, the latitude and longitude of the corners of the search area, or of the datum point about which the search is to be conducted, are given. In the latter case the search radius is also given. For example, a sector search area might be described thus, DATUM 44–30N, 72–20W, SEARCH RADIUS 8 MILES.

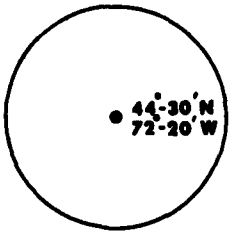


FIGURE 8. Geographical Coordinates.

b. Track Line. The latitude and longitude of the points along a proposed track are given along with a width. For example: SEARCH TRACKLINE 44–30N, 72–20W TO 44–35N, 72–15W TO 44–29N, 72–05W, WIDTH 5 MILES.

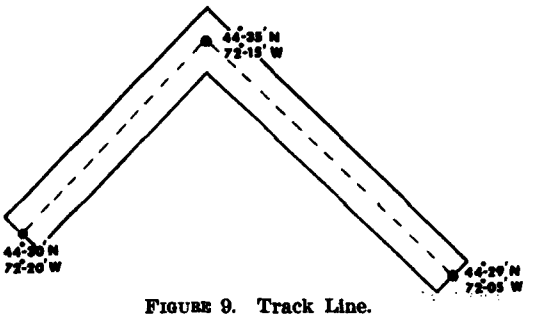


FIGURE 9. Track Line.

c. Center Point. The latitude and longitude of the center point of a search area is given with the direction of the major (longer) axis, the length of the major axis and the length of the minor (shorter) axis. For example, CENTER POINT 44–30N, 72–20W, MAJOR AXIS 060 TRUE, 20 MILES BY 12 MILES.

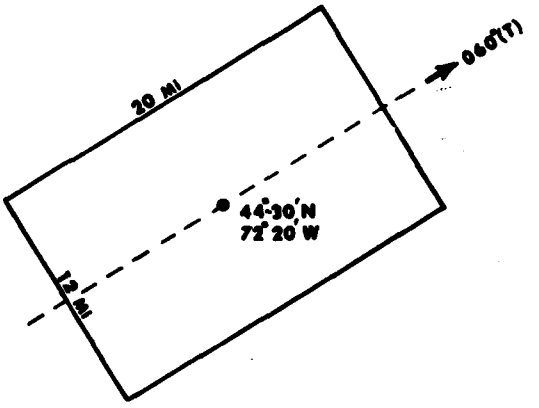


FIGURE 10. Center point.

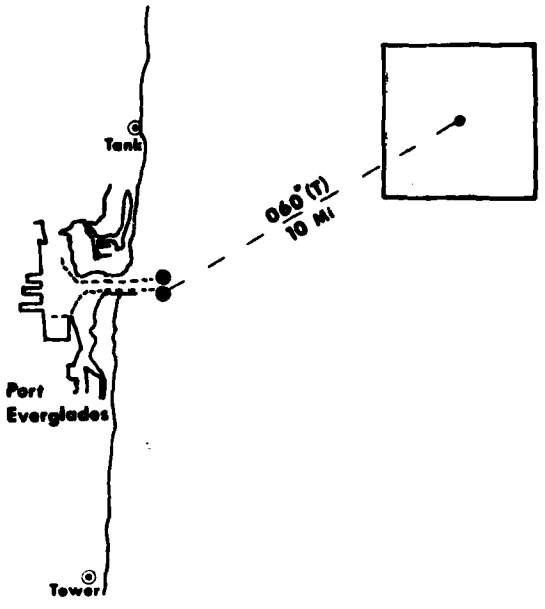


FIGURE 11. Bearing and Distance.

d. Bearing and Distance. A bearing and a distance from a geographical landmark to datum about which the search is to be conducted along with the search radius. For example, 060 TRUE, 10 MILES FROM PORT EVERGLADES SOUTH JETTY LIGHT, SEARCH RADIUS 3 MILES.

e. Landmark. Two geographical landmarks are given with a distance off shore. For example, AREA FROM PORT EVERGLADES SOUTH JETTY, SOUTH TO TOWER, TO TEN MILES OFF SHORE.

0215 Expanding Square Pattern—Sierra ~~Zero~~ 55

This pattern is used when the position of the target is closely known. Legs are North, East, South and West. The first leg is usually North. All turns are to the right. If it is not practical to search the first leg northward, then another first leg direction can be used. No matter what the direction of the first leg all turns are 90° to the right. The pattern shown in Figure 13 has a track spacing (S) of one mile. To use any other track spacing, merely multiply the distances shown in this pattern by the track spacing in miles that you wish to use. For example: to use 4-mile track spacing, the first two legs would be 4 miles, the second two legs would be 8 miles, etc.

The pattern shown in Figure 13 will require 2 hours 27 minutes at 20 knots. With a track spacing of 2 miles, it will require twice as long, or 4 hours 54 minutes.

The following table shows the time required to cover 1 mile at various speeds:

Speed	*Time to Travel 1 Mile*
10 kts.	6 minutes
12 kts.	5 minutes
15 kts	4 minutes
18 kts.	3 minutes, 20 seconds
20 kts.	3 minutes

To execute the ~~SE~~ 55 pattern go to the best estimated position of target and commence the first leg. Select the track spacing. Time each leg, based on length of leg and speed.

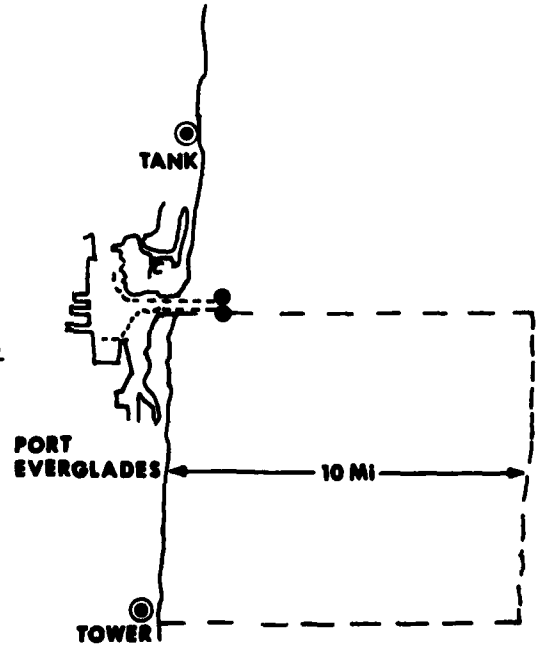


FIGURE 12. Landmark.

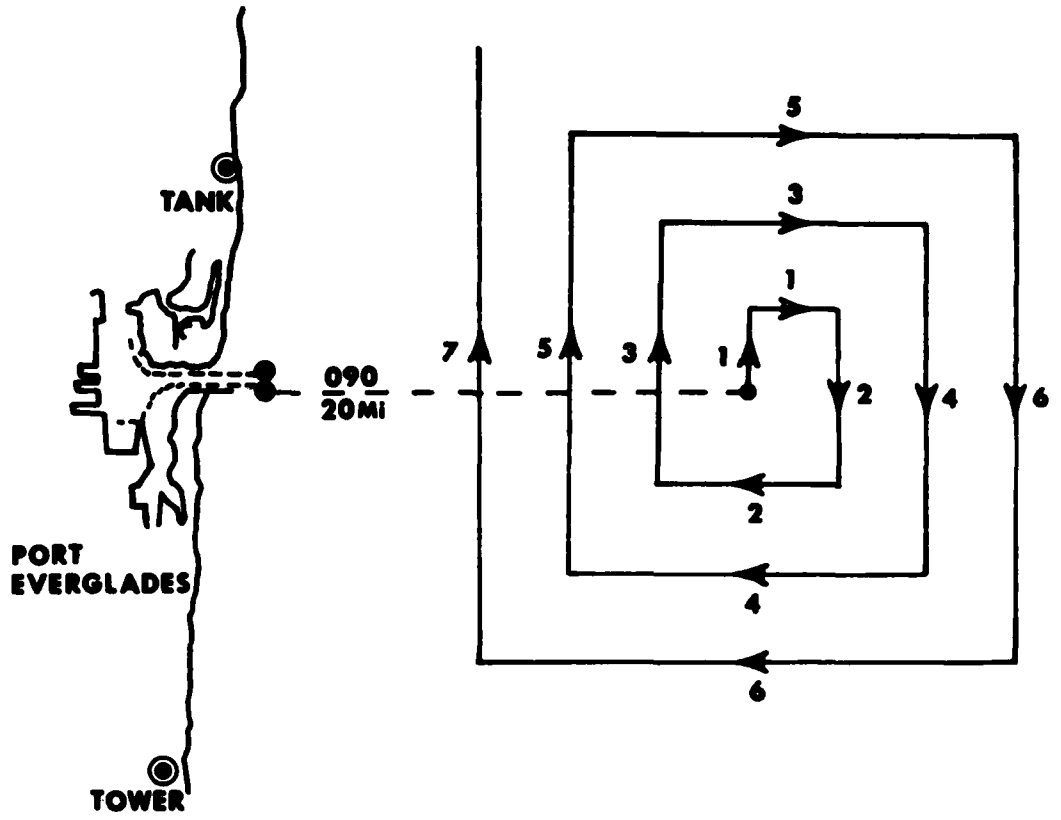


FIGURE 13. Expanding Square Search Pattern.

0220 Sector Search Patterns—Victor (V)

Sector search patterns can be used by one or two boats. The pattern resembles the spokes of a wheel, with the center of the wheel at the most likely position of the target. The center of the search pattern should be marked with a box, or some other floating marker. By marking the center of the search pattern the coxswain has a check on his navigation each time the boat passes near the center of the pattern. The sector search pattern is always centered at the most likely position of the target (datum). Therefore the search unit passes through datum many times, each time increasing the chances of finding the target. While there are many types of sector search patterns, one simple sector pattern is used for small boats. In this search, all the legs are equal to the search radius. Once the radius is chosen, a boat proceeds to the datum, marks it and starts the pattern from there. There are two types of sector search patterns, the Single Unit Sector Search and Multi-unit Sector Search.

a. *Sector Search Single Unit—Victor Sierra (VS).* The VS pattern is used by a single boat. The first leg of this search should be in the direction of the target's drift. All turns in this search are 120° to the right. All legs of the search pattern are equal in length to the chosen radius. All cross-legs of the search pattern are also equal to the chosen radius. Upon completion of the search pattern (upon the search unit's third return to datum), a second pattern is started with the heading of the new first leg 30° to the right of the final course of the first pattern (See Figure 14). For example, if a search is ordered with a one mile radius, and the target drift is north, the searching boat will start

the search by *going north* for one mile then turning right to course 120° and continue for one mile, then turn right to course 240° for one mile to datum and continuing on course 240° for another mile, then turn right to course 000° for one mile, then turn right to course 120° for two miles (one mile to datum and one mile beyond), then turn right to course 240° for one mile, then turn right to course 000° for one mile. The search unit is now back at datum. If a second search is ordered, the search unit begins the first leg on a course of 030°, the cross leg is on a course of 150° and the second and third legs are on a course of 270°. This continues as before, always turning to the right 120° as in the first search pattern.

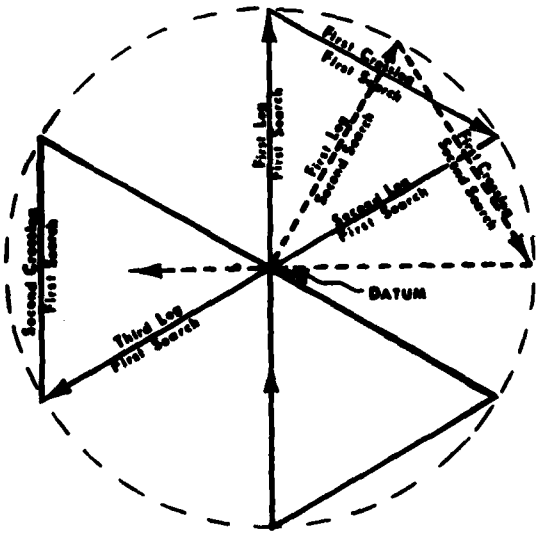


FIGURE 14. Sector Search Pattern—Single Unit.

b. *Sector Search Multi-unit—Victor Mike (VM).* The VM pattern is used when a second boat is available. The second boat starts his pattern at the same datum as the first, but the second boat start its search in a direction 90° to the left of the first boat's leg. If the second boat arrives at datum at the same time as the first boat, the second boat starts its search at a slower speed than the first boat. When the first boat is about one leg ahead of the second boat, the second boat comes up to search speed. This slow start by the second boat will keep both boats from arriving at the center of the search pattern at the same time. When both boats have completed one VM pattern the coverage will be the same as if a single boat had completed two VS patterns. When more than two boats are available, the sector search pattern becomes too complicated and a PM search pattern should be used or the search area should be broken into smaller areas and single unit searches conducted. Figure 15 illustrates the VM pattern.

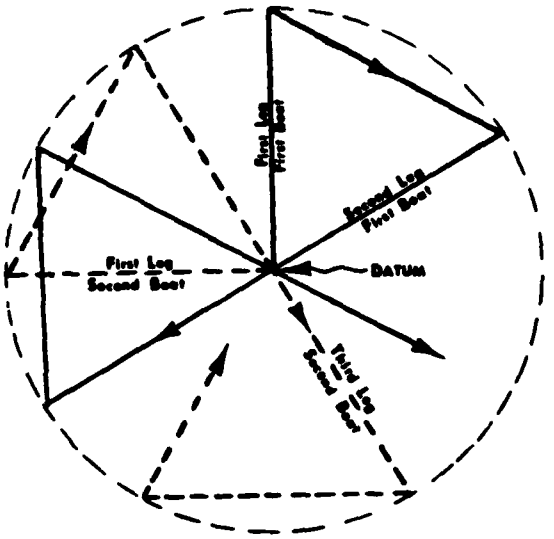
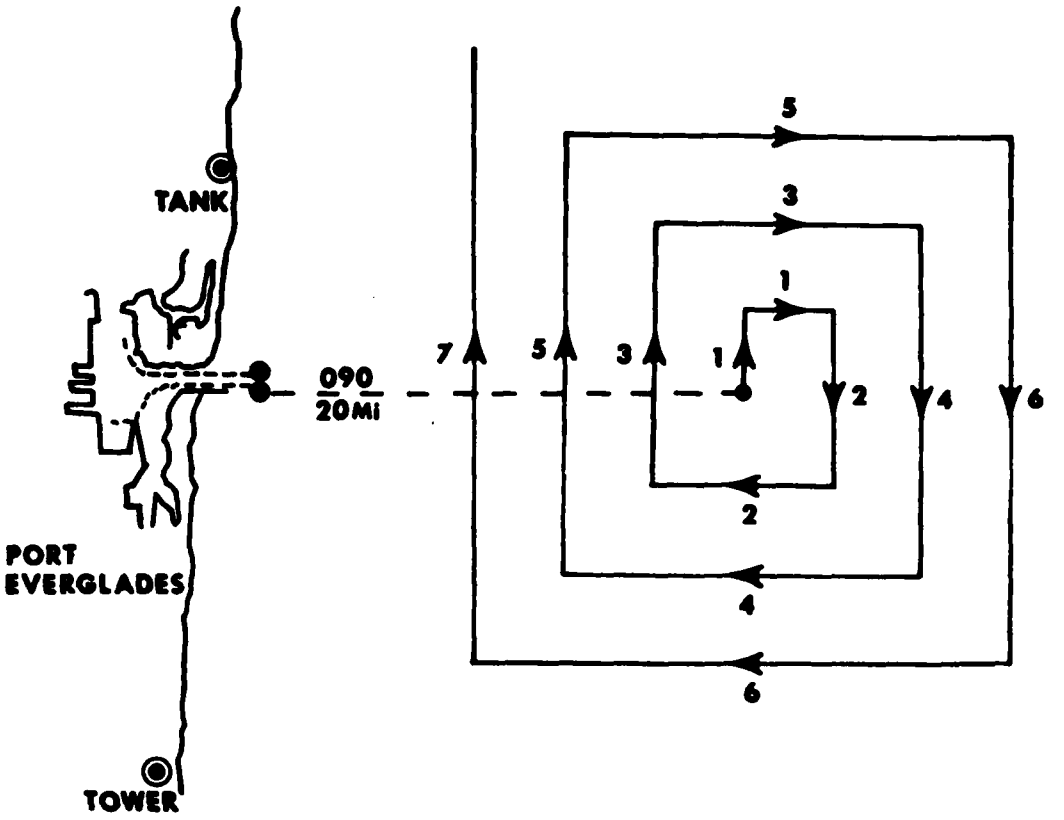


FIGURE 15. Sector Search Pattern—Multi-unit.

c. Figure 16 is a table of running times required for either the VS or VM search patterns for a specific search radius and speed. The table gives the number of minutes required for one leg.

0225 Parallel Track Patterns—Papa (P)

Parallel track patterns can be used by one boat or a group of boats. These are the simplest of search patterns. The coxswain simply steers straight courses or legs, each leg being one track spacing (S) from the other. The legs are parallel to the long side of the search area.



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the search by going north for one mile then turning right to course 120° and continue for one mile, then turn right to course 240° for one mile to datum and continuing on course 240° for another mile, then turn right to course 000° for one mile, then turn right to course 120° for two miles (one mile to datum and one mile beyond), then turn right to course 240° for one mile, then turn right to course 000° for one mile. The search unit is now back at datum. If a second search is ordered, the search unit begins the first leg on a course of 030°, the cross leg is on a course of 150° and the second and third legs are on a course of 270°. This continues as before, always turning to the right 120° as in the first search pattern.

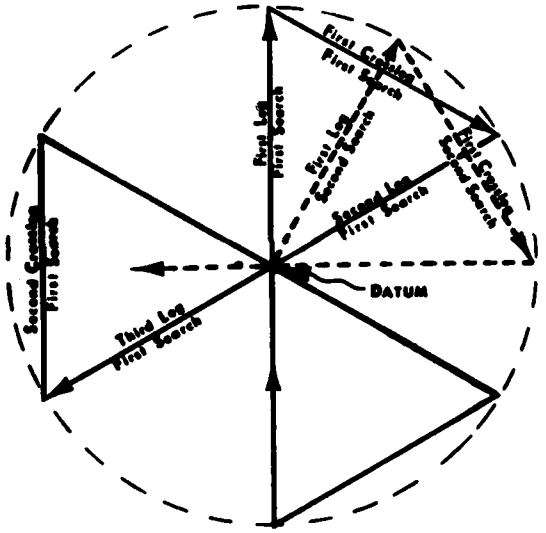

FIGURE 14. Sector Search Pattern—Single Unit.

b. *Sector Search Multi-unit—Victor Mike (VM).* The VM pattern is used when a second boat is available. The second boat starts his pattern at the same datum as the first, but the second boat start its search in a direction 90° to the left of the first boat's leg. If the second boat arrives at datum at the same time as the first boat, the second boat starts its search at a slower speed than the first boat. When the first boat is about one leg ahead of the second boat, the second boat comes up to search speed. This slow start by the second boat will keep both boats from arriving at the center of the search pattern at the same time. When both boats have completed one VM pattern the coverage will be the same as if a single boat had completed two VS patterns. When more than two boats are available, the sector search pattern becomes too complicated and a PM search pattern should be used or the search area should be broken into smaller areas and single unit searches conducted. Figure 15 illustrates the VM pattern.

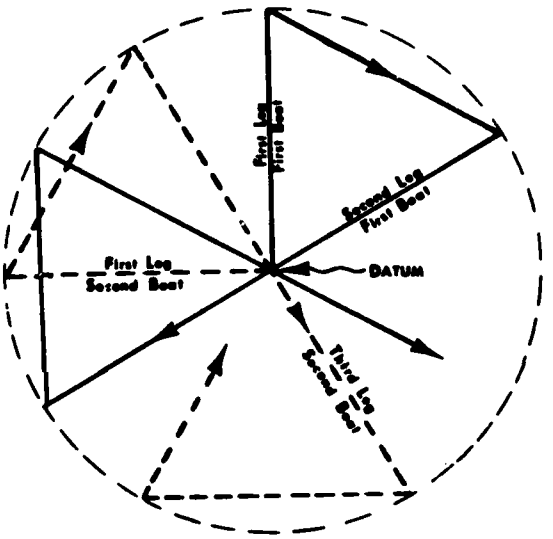

FIGURE 15. Sector Search Pattern—Multi-unit.

c. Figure 16 is a table of running times required for either the VS or VM search patterns for a specific search radius and speed. The table gives the number of minutes required for one leg.

0225 Parallel Track Patterns—Papa (P)

Parallel track patterns can be used by one boat or a group of boats. These are the simplest of search patterns. The coxswain simply steers straight courses or legs, each leg being one track spacing (S) from the other. The legs are parallel to the long side of the search area.

Track Spacing	Minutes on Leg At Speed (in knots)						Total Time Req to Compl Search
	5	7.5	10	12	15	18	
1/2 Nm	6	4	3	2.5	2	1.5	To compute time required to complete one search, multiply the minutes on leg or cross leg by 9.
1 Nm	12	8	6	5	4	3	
2 Nm	24	16	12	10	8	7	
3 Nm	36	24	18	15	12	10	
4 Nm	48	32	24	20	16	13	
5 Nm	60	40	30	25	20	17	

FIGURE 16. Timing Table for VS and VM Search Patterns.

a. *Parallel Track Pattern Single Unit—Papa Sierra (PS).* This pattern is conducted by a single boat as shown in Figure 17.

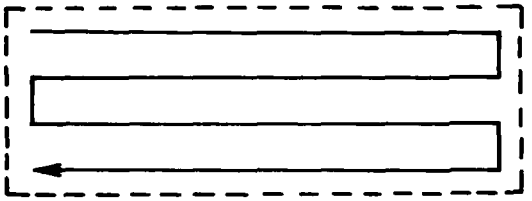

FIGURE 17. Parallel Track Pattern—Single Unit.

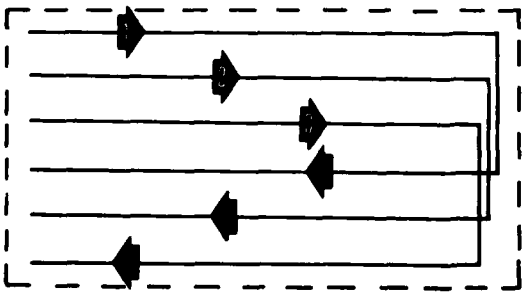

FIGURE 18. Parallel Track Pattern—Multi-unit.

b. *Parallel Track Multi-Unit—Papa Mike (PM).* This search is based on the same principle as the PS pattern except that more than one boat are searching in line abreast. It is particularly useful when a number of fishing boats or pleasure craft are available for searching an area and can be instructed what to do by radio. Figure 18 illustrates this pattern.

0230 Creeping Line Pattern—Charlie Sierra (CS)

This is the same search as the PS except that the legs are parallel to the short side of the search area, as shown in Figure 19.

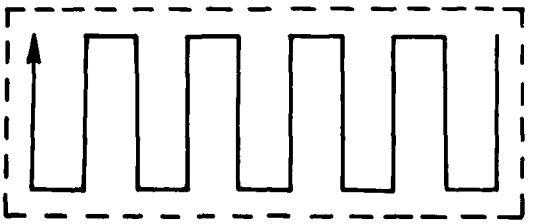

FIGURE 19. Creeping Line Pattern—Single Unit.

0235 Track Crawl Pattern Return—Tango Sierra Romeo (TSR)

This search is used to search a track or bearing. You simply go out at a distance one half a track spacing to one side of the bearing or track, and come back at a distance one half spacing on the other side as shown in Figure 20.

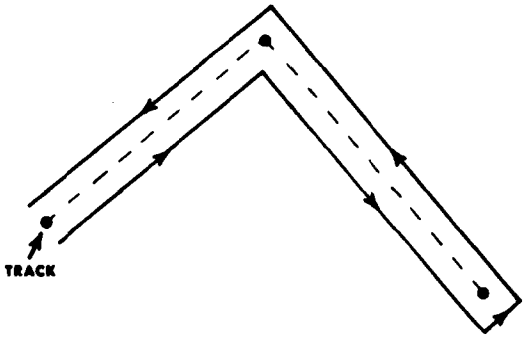

FIGURE 20. Track Crawl Pattern (Return)—Single Unit.

Section 3. TOWING AND SALVAGE

0300 General

This section contains Coast Guard policies and procedures for towing and salvage of disabled vessels.

0305 General Towing Policy

In the promotion of maritime safety on and over the high seas and waters subject to the jurisdiction of the United States, the Coast Guard renders all practicable assistance to those who follow the sea whenever the Coast Guard can reasonably do so. In those cases where the situation is not serious, the Coast Guard may render assistance to the extent that resources are reasonably available. The area commander or the district commander, upon receipt of information that a vessel or person is disabled or in potential distress, should send a Coast Guard vessel or aircraft, as appropriate, to the scene. Upon arrival at the scene, assistance rendered may include, but is not limited to, the following:

(1) Technical assistance furnished on the spot.

(2) Miscellaneous supplies and equipment furnished for the purpose of effecting temporary repair on the spot.

(3) Towage to the nearest port in which *emergency* repairs can be made.

Towing to the nearest port where emergency repairs can be effected does not imply that the port must have complete facilities to perform permanent repair work. Nor does it imply that the Coast Guard should tow the vessel to the repair yard itself. Normally, in a port where commercial towage is available, the Coast Guard will have discharged its responsibility when the distressed vessel is brought to a safe anchorage; however, if a vessel is loaded with perishable cargo, a tow to the nearest port where the cargo may be discharged will normally be provided, if the operational situation permits.

0310 Vessels Out of Fuel

Many cases arise where the vessel is disabled because of lack of fuel. The cause of the fuel shortage is immaterial, although in most cases it is poor judgment. In all such cases, a check should be made on arrival at the scene to determine if the vessel does in fact require fuel to reach the *nearest port where fuel may be obtained.* If a shortage exists, sufficient fuel to reach the nearest port may be invoiced to the vessel following procedures in the Comptroller Manual (Volumes 3 and 4). The above procedure will also be followed by Lightships from whom requests for fuel are made. Due regard for weather conditions existing or expected should be exercised. If the Coast Guard vessel does not have the proper fuel, then towage to the nearest fueling port is indicated as outlined below.

0315 Commercial Enterprise

Although the Coast Guard will not compete or interfere with private towing activities or other commercial enterprise, it cannot rely upon private enterprise to render assistance in minor cases and itself act only when extreme jeopardy exists. Even though reliable information is received that a tug or other private assistance is proceeding to the scene, there is no assurance that it will complete the mission until it is on the scene and has the situation in hand. Until then Coast Guard units should proceed toward the scene.

If, upon arrival at the scene, private enterprise is already there and is rendering assistance, or is willing to render assistance, the

Coast Guard shall not interfere with the private activity unless it becomes apparent that private enterprise cannot cope with the situation and that action by the Coast Guard is necessary to prevent loss of life or property. The private salvor's ability to carry out the operation is best determined by the Coast Guard On-Scene Commander, but if doubt exists, the matter may be referred to the district commander. In all doubtful cases, however, the Coast Guard unit shall stand by and be prepared to render assistance until it is apparent that no further assistance is required.

When a Coast Guard unit is already rendering assistance and private assistance arrives on-scene, the Coast Guard vessel shall turn the case over to the private operator if: (1) he desires to accept it; (2) the character of the assistance he can render is adequate; (3) the operator of the assisted vessel agrees; and (4) the shift of responsibility can be accomplished without further endangering the craft in trouble. Actual refusal to release the disabled vessel to a private operator whose facilities are deemed inadequate will only be done after careful consideration. Should the operator of the disabled vessel, or the owner of an unmanned vessel, refuse to accept commercial assistance, or remain silent the Coast Guard vessel will discontinue towing and stand by, if such a step can be taken without endangering the disabled vessel. Otherwise the tow shall be continued until it can be discontinued without danger. If towed to the vicinity of a harbor entrance or safe anchorage under these circumstances, the possibility of the towed vessel creating a hazard should be carefully considered. The length of time that a Coast Guard vessel is required to stand by while the commercial salvor and disabled vessel are negotiating will depend on the circumstances. Should a more urgent case arise, the Coast Guard vessel is free to depart and undertake the more urgent case. If no other cases are pending, the Coast Guard vessel should stand by until the negotiations are concluded, and the commercial salvor has taken the disabled vessel in tow.

Should a Coast Guard vessel arrive at the scene before a commercial salvage vessel, the Coast Guard vessel may take the vessel in tow pending arrival of the salvage vessel, if such action will contribute to the safety of the distressed vessel or reduce the time in which the Coast Guard vessel is required to stand by.

0320 General Salvage Policy (Other Than Towing)

Coast Guard units should engage in salvage other than towing only when no commercial salvage facilities are on scene performing salvage, and limited salvage operations (e.g. ungrounding, pumping, damage control measures, etc.) by the Coast Guard can prevent a worsening situation or complete loss of the vessel. When commercial salvors are on scene performing salvage, Coast Guard units may assist them within the unit's capabilities, if the salvor requests. Coast Guard units and personnel shall not be unduly hazarded in performing salvage under the authority of this section.

0325 Towing and Salvage of Small Craft

Conflicts relative to towing and salvage of large vessels seldom arise since arrangements are usually made between the owners or agents and private salvage companies. With smaller boats and vessels, the value of property is such that private towing is often unprofitable. In such cases the Coast Guard unit may be the only one in position to render assistance. Even should private towing assistance be offered, the operator of a small craft is under no obligation to accept it. Should he refuse, a Coast Guard unit is not obliged to assist as long as the private towing vessel is standing by. If it departs or if the situation worsens to the extent that life and property are in danger, the Coast Guard unit then should render assistance.

Paragraph 0320 applies to small craft which need salvage other than towing. However, when no commercial salvage companies are available within a reasonable time or distance,

the district commander may modify the policy of paragraph 0320 to provide for refloating a grounded boat which is not in peril of further damage or loss if:

a. the Coast Guard units are capable of rendering the assistance;

b. the owner requests the assistance and agrees to the specific effort to be made; and

c. Coast Guard units and personnel are not unduly hazarded by the operation.

Occasionally an operator will insist that the Coast Guard take action, such as pulling a vessel from a reef, that the Coast Guard personnel on scene consider unwise. The Coast Guard is under no obligation to agree to any such request or demand. If a decision to comply with such a request is made, it should be made clear to the operator that he is assuming the risk of the operation and the fact that the action is undertaken at his request against our advice should be logged.

0330 General Procedures when Towing Vessels Under 65 feet in Length

a. *Wearing of Personal Flotation Devices.* Towing is a potentially dangerous evolution, which is often compounded by poor weather conditions and the crossing of breaking bars or inlets. While every effort is made to insure the safety of life and property in all instances, the fact remains that a number of boats each year sink or capsize while under tow by the Coast Guard. Occasionally, loss of life has resulted from these mishaps. Since the wearing of personal flotation devices would reduce the possibility of loss of life during towing operations, vessels under sixty-five (65) feet should normally not be taken in tow until all POB on the towed vessel are wearing approved personal flotation devices. While it is recognized that every towing situation does not warrant the wearing of PFDs, it must be remembered that the safety of the POB and the vessel being towed is in part the responsibility of the boat coxswain and the Coast Guard; therefore, the wearing of PFDs must at least be considered in every towing evolution. In cases where insufficient personal flotation devices are available, Coast Guard personal flotation devices, in excess of crew requirements on the assisting unit(s), should be furnished for those persons in need of them. At no time should the stricken vessel be left in immediate danger while waiting for personnel aboard to don their personal flotation devices. If there are insufficient personal flotation devices to go around, do not wait for more to arrive before rendering assistance. Priority consideration upon arriving at the distress scene is: removing the vessel and occupants from immediate danger, then getting all personnel into personal flotation devices as soon as possible. It is stressed that only the wearable types of personal flotation devices fully meet safety requirements; however, other types may be used if not enough wearable PFDs are available.

b. *Removal of Personnel.* When conditions warrant and the opportunity is presented, it is desirable to remove all civilians from the disabled craft, and place a Coast Guardsman aboard. This decision should be made only with the concurrence of the people involved. The determining factor should be the safety of the people and boats involved, considering the hazards of going alongside. Prudence should be exercised to avoid making a bad situation worse. Consideration should be given to the weather conditions and the design of vessel, as well as the physical and psychological state of the POB.

c. *Deck Fittings.* Another hazard in towing small craft involves the poor strength characteristics of cleats and fittings aboard many of today's pleasure craft. Extreme caution should be used in determining the best possible towing procedures by anticipating the strain and stress of the tow. In view of this, consideration must be given to the method of securing the tow line to the boat (e.g., securing the tow line to the stem pad eye which is available on most trailerized small boats, or by rigging a bridle around the towed vessel).

d. *Communications.* Under certain operating conditions involving the towing evolution, it is essential that a system of communication with the towed vessel be established. The coxswain of the towing boat must insure that those he is assisting understand and agree on

a signal to indicate trouble. Ideally, stationing a Coast Guardsman on board with a portable communication rig would insure quick response to urgent situations. As an alternative, most units have portable radios that could be carried on board Coast Guard boats when underway, thereby providing a ready communications resource which could be transferred to a disabled vessel utilizing some type of water-tight enclosure. Directions for use of the radio are on the back of the set. However, the radio could be switched on and preset for working frequency, prior to transfer to the disabled craft in order to insure immediate operation. This procedure would be of particular value during night-time operations. Other methods such as flashing lights, warning flag or rag, hand signals, etc., may also be utilized by the coxswain, depending on the on-scene conditions. It must be remembered that it is incumbent on Coast Guard personnel to learn as much as possible about conditions on the towed vessel, and this information must be continuously updated. Regular checks utilizing the radio or other means of communication are essential elements which will assist in insuring a safe evolution.

e. *Tidal Considerations.* Many of the incidents which resulted in damage to grounded small craft could have been avoided by waiting for a rising tide before attempting to refloat, and by inspecting the hull in some manner to determine if it is water-tight. The fact that certain small craft are left high and dry by receding tide may not cause damage, if suitable preventer lines are rigged to prevent capsizing, or to maintain it upright on the incoming tide.

f. *Unit Training.* All units operating SAR boats must have a SAR Boat Training Program pursuant to CG–313. Note that part of this training program is devoted to Seamanship and Safety, and includes towing methods, care, techniques and dangers associated with this operation. A complete program will cover detailed procedures for the towing of vessels or small craft and sailboats, including righting small sailboats.

Section 4. LIABILITY RELEASES

0400 Coast Guard Policy on Liability Releases in Assistance Cases

The question has often been raised as to the need for Coast Guard units to obtain a liability release prior to rendering aid. Court decisions do not generally favor the use of releases to avoid liability for future negligence, especially in situations where the person giving the release is in an emergency situation and has little choice in the matter. Coast Guard personnel should concentrate on the primary task of assisting persons and property in danger to the best of their ability, realizing that the best defense against any allegation of negligence is to be able to show that a high standard of care was exercised when rendering assistance.

0405 Liability releases shall not be used in assistance cases.

Section 5. SAR DOCUMENTATION

0500 Assistance Reports

The requirements for assistance reports are contained in the Search and Rescue Reports Manual (CG–397).

0505 SAR Case Studies

In many instances, searches for missing craft or persons are unsuccessful. Some cases are never solved while in others the missing craft is found by a passing aircraft or vessel after search efforts have been abandoned. In the latter case, a fairly accurate reconstruction can be made by interviewing the survivors and reexamining the entire search effort with the insight afforded. Such a study may provide clues for improving our SAR procedures.

In successful cases, methods or procedures used may be of such value that the case should be documented for use by other SAR personnel, or unusual environmental factors justify detailed study of the case.

0510 A SAR Case study shall be submitted by the SAR Coordinator concerned to the Commandant (G-OSR) via the operational chain of command, information copies to Officer in Charge, National Search and Rescue School, U.S. Coast Guard Training Center, Governors Island, New York, and Commander Atlantic Area, Attn: Operations Analysis Branch, when any of the following occur:

a. A search fails to locate a target, the search effort is terminated, and the target is later found.

b. A search effort is considered to be of unusual interest due to new methods or procedures used or unusual experience gained.

c. A search fails to locate a target with resultant loss of life, and there is reason to believe that a case study would be advantageous.

d. A case study is requested by the Commandant or Area Commander.

0515 SAR Case Studies shall be concise and deal only with those factors which are believed to have significant bearing on the case. A consolidated case narrative shall be part of all SAR Case Studies. The following should also be included where applicable and if known:

a. Assumptions used in planning each search effort including: assumed distress positions and times, assumed search target types (craft afloat, raft, person in water, etc.) and assumed leeway parameters.

b. Environmental data available including sea current, wind and visibility; these data should be labeled as to source, confidence value, and whether and for what purpose they were actually used for planning.

c. Actual distress positions and times, and actual search target type.

d. For each day's operation: search area coordinates, type of craft assigned, search patterns used, planned and actual sweep width and track spacing, and computed datum points.

e. Debriefing information from survivors giving actual drift reconstruction, observed environmental conditions, and sightings of search craft.

f. Whether or not SARP, CASP, or any other computer SAR system was used in search planning; if not, why not; and, if used, an evaluation of its effectiveness.

g. In cases involving the use of computer SAR, append the following *to the copy of the SAR Case Study mailed to COMLANTAREA (Aso):*

(1) Copies of the computer SAR input and output. If this material is too bulky, it may be mailed separately.

(2) A copy of any flow-charts used in the computer SAR system employed in the case.

Comments concerning the following are also desirable: use of or lack of detection aids, reasons for failure to detect the target, adequacy of communications, performance of equipment and adequacy of SAR units.

0520 SAR Case Narratives

SAR Case Narratives shall be submitted by SAR Units when directed by higher authority or when, in the opinion of the Commanding Officer or Officer in Charge the SAR Unit's action should be so documented. The account shall consist of a narrative account of the case from the unit's viewpoint and such comments as are appropriate for amplifying remarks. The account shall be submitted by letter to the operational commander for the SAR case. The subject line shall identify the case by descriptive wording and by the case number used on the Assistance Report.

0525 Examples of cases where a Case Narrative should be considered are:

a. A SAR Case Study is being conducted; or

b. The case has received widespread public notice or high level government interest has been indicated; or

c. An account of novel or unusual techniques used may be of value to other SAR Units; or

d. Recommendations for improvement in standard procedures or equipment are made based on the experience gained in the case.

0530 Operational commanders receiving SAR Case Narratives shall act on them as follows:

a. Disseminate the information contained therein as appropriate; or

b. Revise procedures and operational doctrine if indicated; or

c. Include data and narrative accounts in SAR Case Study if one is being conducted; or

d. Forward the narrative to the senior in the chain of command who requested it when the narrative is in response to such a request; or

e. Forward the narrative to the Commandant (G-OSR) when it is considered of service-wide interest.

0535 Operational commanders should submit a consolidated Case Narrative separately, when it is considered useful and a SAR Case Study is not necessary.

0540 Equipment Data

SAR Case Studies and Narratives provide one of the few opportunities for the Commandant to get definitive information on the performance of lifesaving equipment used by survivors. Problems with the equipment may have been encountered. Survivors may criticize the performance of the equipment or may have recommendations for its improvement. In order for the Commandant to take corrective action the equipment must be identified. In such cases Coast Guard personnel debriefing survivors should obtain the following information and include it is the SAR Case Study or Narrative:

a. Coast Guard approval number (if approved).

b. Name of manufacturer (if not approved).

c. Size, capacity, or model number (if not approved).

d. Date of manufacture.

e. General condition of the equipment, including its defects and inherent capabilities.

f. Statements of survivors concerning their experience with the equipment.

0545 Dissemination of SAR Case Studies and Narratives

Release of Case Studies and Narratives in response to requests from members of the public shall be governed by the terms of the Freedom of Information Act (FOIA). The incident which is the focus of a Study or Narrative may have become the subject of litigation. Also, some portion of these records may fall within one or more of the Act's exemptions from public disclosure. Upon receipt of any request for public disclosure of a Case Study or Narrative the procedures described in Commandant Instruction 5212.6 series must be followed.

0550 Datum Marker Buoy (DMB) Data

A datum marker buoy drifts well with the sea surface current and provides an excellent description of the average surface current between position determinations. These current data are useful, not only for the specific SAR case during which the DMB is dropped, but also for on-going research projects involving the application of surface current to SAR, pollutant drift, and ice drift. It is in the national interest to keep a permanent record of this data. This shall be accomplished as follows:

a. Each aircraft and/or surface unit dropping a DMB for SAR or other operational purposes shall notify the controlling operations center (RCC) of the time and position of insertion.

b. Each aircraft and/or surface unit determining the subsequent position of any DMB which has previously been inserted by any unit shall advise the controlling operations center (RCC) of the new time and position.

c. The operations centers (RCCs) receiving the position information shall complete the DMB data form, CG–5111, figure 20a, after each operation in which DMBs are used. A separate form shall be used for each DMB employed. The completed forms should be mailed within one week after the operation.

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Front

DATUM MARKER BUOY DATA			
DISTRICT:		CASE NO.:	
	LATITUDE	LONGITUDE	DATE/TIME (Z), MONTH/YEAR
ORIGINAL DATUM POSITION:			
INTERIM POSITIONS:			
FINAL POSITION:			

INSTRUCTIONS: Make initial entry when datum marker buoy is deployed. Make additional entries for relocations at minimum time interval of about six hours. The final position is the last known position. Mail the card when this position is entered.

DEPT. OF TRANSP., USCG, CG-5111 (1-77)

Back

FIGURE 20a. DMB Data Form

Section 6. SAR COORDINATION

0600 General

This section discusses general SAR coordination under the National SAR Plan, agreements, liaison, conferences, seminars and councils. It provides guidance to SAR Coordinators on the delegation of the SAR Mission Coordinator (SMC) function, on the establishment of Coast Guard Rescue Subcenters (RSCs), on the general question of assumption of control of a SAR mission by the SAR Coordinator when control is originally held by a subordinate unit, and on other means of coordinating a SAR mission.

0605 SAR Coordination

The National SAR Plan, since its inception, has designated the Coast Guard as the Regional SAR Coordinator for the National Maritime SAR region. The Commandant in turn has subdelegated coordination responsibilities as outlined in the U.S. Coast Guard Organization Manual (CG–229) and the National SAR Manual (CG–308). Experience since the establishment of the National SAR Plan has revealed several effective instruments of preplanning and evaluation which facilitate operational coordination during actual SAR cases. These are agreements, liaison, conferences, seminars and councils. These techniques are discussed further below.

0610 Agreements

"SAR AGREEMENTS" in the normal sense means written agreements. Understandings arrived at through one of the other means of SAR coordination are sometimes referred to as informal agreements. The term "agreements" as used herein means written agreements. These may deal with a large variety of subjects, usually those whose nature is such that it is considered best to define the arrangement in writing. Any such agreements arrived at shall conform to the National SAR Plan and the agreements of superiors in the chain of command. Agreements with SAR authorities of other countries shall be confined to operational and technical matters. All international agreements (agreements with SAR authorities of other countries) must be negotiated in accordance with Commandant Instruction 16201.2 series, which provides guidance to insure compliance with applicable laws. Specific directions for concluding domestic agreements are as follows:

a. *Authority.* SAR Coordinators may enter into agreements without specific approval of the Commandant for each case. However, area commanders, in their capacity as Regional SAR Coordinators, may prescribe further requirements concerning the approval of specific agreements within their area of responsibility.

b. *Scope.* The scope of SAR agreements should be such as to solve the local problems under consideration. Additional agreements should not be executed if the questions involved are adequately dealt with by the National SAR Plan or by agreements executed by seniors in the chain of command. Agreements which are local in nature are most often necessary where certain local responsibilities need to be more clearly defined or a contingency plan needs elaboration. Many other questions can be resolved by one of the other types of coordination instruments described below.

c. *Agreements with States.* Wherever possible, agreements with States which are considered necessary should be incorporated in Boating Safety Agreements, as outlined in COMDTINST 16750.3 series. For those states and territories where land areas are included in the SAR Coordination responsibility (Hawaii, Puerto Rico, Virgin Islands, and parts of Alaska), it may be necessary to execute a more comprehensive SAR agreement.

d. *Distribution.* Two copies of new SAR agreements shall be forwarded to the Commandant (G-OSR). Area and district commanders may prescribe additional requirements for distribution of agreements made by commands under their jurisdiction.

e. *Review.* Each command which is signatory to any agreements shall conduct an annual review in order to insure that all agreements are up-to-date and still necessary.

f. *Cancellation.* Those agreements which are no longer necessary shall be cancelled promptly. Commandant (G-OSR) shall be advised of such cancellations.

0615 Liaison

A continuing liaison program shall be implemented by SAR Coordinators within the scope of their responsibilities. Such liaison consists of periodic contacts with appropriate officials of other agencies, Federal, State, local, and private, who have an interest in SAR within the SAR Coordinator's area of coordination responsibility or who may have facilities which can be included in the SAR network. Active support of and participation in local SAR workshops, water safety councils or other such organizations are encouraged. In the case of liaison with States, this often can, and should be, combined with liaison conducted with States under the Boating Safety Program. Those SAR Coordinators whose area of responsibility adjoins that of other friendly countries should conduct a liaison visiting program with SAR authorities of those countries in order to effect mutual understanding in joint international SAR operations. Liaison visits by officials of other countries to the facilities of the SAR Coordinator should be encouraged.

0620 Conferences and Seminars

A SAR conference is usually a limited affair of fairly narrow scope with attendance limited to commands and/or government agencies immediately concerned with the problems under discussion. A SAR seminar is more open and often includes industry and private organizations. In major ocean areas, the seminar may be developed into an international forum as an instrument of implementation of international standards and recommendations. The seminar approach may deal with SAR and related fields or may be part of a wider spectrum of safety. Its scope may be broad or narrow; its purpose may be merely to serve as a forum for exchange of views on the subjects under discussion or to obtain a variety of opinions about the problems on the agenda. However, such seminars sometimes point the way for plans of action which may be further developed in the future. Most conferences and seminars are held for planning purposes or for the purpose of cross dissemination of information. Somewhat different from these, but of no lesser importance, is the critique type conference which is called after the fact. A SAR Coordinator may call such a conference after a specific SAR case in order to review the practices and procedures used during the operation. These can be particularly valuable when a number of services or agencies have been involved. A report on such critique type conferences can be used as a basis for a SAR case study as prescribed in paragraph 0505 above.

0625 Maritime SAR Councils

A Maritime SAR Council is a committee created on the initiative of the Coast Guard and composed of federal, state, local, volunteer groups, etc, which have a SAR capability in a localized portion of the Maritime SAR Region. They are a means whereby a SAR Coordinator or a subordinate can coordinate the capability on a long-term basis. They are usually associated with identifiable bodies of water such as lakes, bays, sounds, etc. or with metropolitan areas on such bodies of water. They may include land areas where such areas are included in the Maritime SAR Region.

The purpose of a council is to coordinate the activities of the various groups, resolve problems involving SAR operations, and provide for contingency plans where needed. SAR Exercises should be provided for, and critiques should be conducted after exercises or after major SAR incidents.

SAR Coordinators and subordinates should consider this kind of coordinating method in their areas. Groups with specialized capability which might be needed from time to time such as scuba divers, professional divers, fire-fighting services, emergency medical services, etc. should be included in the council as well as groups which normally respond to SAR incidents.

In port areas where the Captain of the Port has already established an interagency mechanism for contingency planning for major threats to port safety, consideration should be given to using the same mechanism for less serious types of SAR incidents.

0630 Use of Coordination Methods

SAR Coordinators, under the direction of their superiors in the chain of command, shall use the coordination methods prescribed above as appropriate to the given situation in their areas of responsibility. Suggestions for refinements or improvements in this guidance material should be forwarded to the Commandant (G-OSR).

0635 SAR Mission Coordination

SAR Coordinators should be guided by the following recommended practices for the purposes of SAR mission coordination:

a. Generally as soon as an incident comes to the attention of a SAR Coordinator, he assumes the function of SMC through his RCC until such time as the SMC function is delegated to another command. The SAR Coordinator should retain the function of SMC unless a unit qualified to act as such is available and properly situated to handle the assignment. When determining whether a specific command is qualified, the following must be considered:

(1) The nature of the case;

(2) The experience and specific training of personnel at the command;

(3) The number of persons considered in (2) who will be available if the case extends over a lengthy period of time.

(4) The adequacy of command and control facilities and equipment available at the command.

b. Specific units should be considered in the following order of priority for assignment of the function of SMC:

(1) Another command (Coast Guard or other service) having a designated RCC. Since personnel and facilities are specially provided to designated RCCs for the purpose of coordinating SAR operations these are the most qualified to handle the SMC function.

(2) Another Coast Guard Command having an RSC designated in accordance with subsection 0640 below. Next to a command with a designated RCC, a command with a designated RSC should be the most qualified to coordinate the types of SAR missions for which the RSC was established.

(3) A Coast Guard Air Station. Air Stations are usually well qualified to coordinate SAR missions.

(4) A Coast Guard Group Command. Since Group Commands vary so much in capability, a general rule cannot be prescribed. Some Groups will be capable of coordinating most SAR missions, while others will be able to prosecute only the most routine missions. In all cases the SAR Coordinator must carefully consider the experience level of the Group personnel prior to delegation of the SMC function.

(5) An operational command of another service. Normally the SMC function should not be delegated to an operational command of another service unless that unit is a specialized SAR unit or has SAR trained personnel available in sufficient depth to handle the job.

c. Regardless of all other considerations, the SAR Coordinator should exercise great care in delegating the SMC function to another command in the following cases:

(1) Comprehensive search planning or comprehensive rescue planning is involved.

(2) Special coordination problems can be foreseen. Multi-service operations fall into this category as does the situation where more than one Group will become involved, or a mixture of district units and Group units are expected to participate.

d. The SAR Coordinator should always be alert to the need to relieve a subordinate of the responsibility of SMC when the unit is ill-equipped to perform that function (see 0635a) but has assumed it of necessity or in accordance with standing directives. Standing directives should encourage subordinates to provide the SAR Coordinator with early information on cases which may exceed their capabilities and to request that the SAR Coordinator relieve them when they believe this to be so.

0640 Establishment of RSCs

Ordinarily an RSC is established only when the SAR Coordinator cannot exercise direct and effective control over SAR facilities in certain sections of his area. It will be a rare instance when this occurs in the Coast Guard. In most instances the need for a shift in control to another unit will be such that the expedient of using the SMC designation will suffice or an SMC team will be dispatched to an Advanced SAR Staging Base. If the SAR Coordinator does establish a Coast Guard RSC, he must insure that properly qualified personnel are available at all times that the RSC might be activated and that the facilities available to the RSC are adequate to the task. The qualifications of personnel should be the same as those for personnel in an RCC.

Section 7. SAR MISSION COORDINATOR AND RCC CONTROLLER TRAINING AND QUALIFICATION

0700 General

Coast Guard personnel assigned to duties which will involve coordination of search and rescue missions shall become fully qualified in all aspects of SAR incident analysis, search planning and SAR mission management as described in the National Search and Rescue Manual. While it is possible to qualify personnel in those skills by on-the-job training, it is more desirable from the standpoint of uniformity and thoroughness of training to qualify such persons by means of the more formal training provided by the National Search and Rescue School and the Coast Guard Institute Search and Rescue course.

0705 Qualification Procedures for RCC Controllers

A person assigned to duty as a Rescue Coordination Center Controller should be a graduate of the National SAR School. Ideally a newly assigned RCC Controller should attend SAR school en route to his new assignment. Where that is not possible he shall be scheduled to attend SAR school at the earliest practicable date. While awaiting assignment to SAR school the individual should enroll and make every effort to complete the Institute SAR course and should be closely supervised in an on-the-job training status.

0710 Qualification Procedures for SMC Watchstanders

Operations watch-standing personnel attached to Air Stations and those Group Commands which may be expected to act as SMC shall become qualified by the completion of the National SAR School course, the Institute course, or a formal period of on-the-job training. In the case of formal on-the-job training, the individual shall be certified as qualified by the Group Commander or Commanding Officer when he has demonstrated his capability. An individual should not be assigned to operations watch-standing duties until he has met one of the above qualification requirements.

Section 8. SAR OPERATING RESTRICTIONS

0800 Restrictions on the Operation of Harbor Tugs, Medium

Stability data on 110′ WYTM "C–class" indicates that this cutter class should be employed only on operations in protected or semi-protected waters (lakes, bays and sounds) where winds will not be expected to exceed sixty knots. Studies made of the 110′ WYTM "A-" and "B-classes" with their greater freeboard indicate that the stability of these cutters is such as to permit coastwise operation, but that these classes should not be subjected to wind velocities in excess of sixty knots.

0805 Aside from the relative instability of these cutters, they do not have the capability for maintenance of water tight integrity of the main deck. Additionally the freeing port area in the bulwarks is inadequate to cope with taking green water. This information shall be considered when assigning any of the WYTM class to SAR operations.

Section 9. UNDERWATER LOCATION OF CRASHED AIRCRAFT

0900 GENERAL

Many instances are on record where aircraft downed in moderate to shallow waters have not been found, or excessive time and funds have been expended in determining their locations. This has resulted in degradation or loss of crash evidence. As many of these aircraft could have been located with the help of an installed Underwater Acoustic Beacon ("pinger"), all Coast Guard aircraft will be equipped with the Dukane Model N15F210B "pinger". This "pinger" will provide a sound source in the submerged aircraft which may be detected by surface craft and precisely located by divers through the use of an Underwater Acoustic Locator System. Six of these Locator Systems (Dukane Model N30A5A) are being placed with custodial units which were selected based on the availability of divers (Strike Team) in the CONUS and provision to isolated units for immediate use of the Locator System.

0905 Underwater Acoustic Locator Systems

The Underwater Acoustic Locator Systems (Dukane Model N30A5A) are located as follows (1 system/unit):

(1) Atlantic Strike Team
(2) Gulf Strike Team
(3) Pacific Strike Team
(4) Air Station Puerto Rico
(5) Air Station Barbers Point
(6) Air Station Kodiak

Each custodial unit possessing a Locator System (Dukane Model N30A5A) shall maintain a complete set of Manufacturers Handbook/Technical Manuals on the equipment. An Underwater Crash Location Detail shall be trained and local procedures prepared to insure proper maintenance, testing and operational readiness of the Locator System. Underwater operations shall be conducted by qualified divers.

0910 Locator Equipment Description

a. The Underwater Acoustic Beacon ("pinger") mounted in Coast Guard aircraft is a Dukane Model N15F210B (Figure 21). The specifications for the beacon are:

Operating Frequency:	37.5±1 kHz
Operating Depth:	Surface to 20,000 feet
Pulse Length:	Not less than 9 milliseconds
Pulse Rate:	Not less than .9 pulse/second
Operating Life:	30 days
Operating Temperature:	+20°F to +100°F
Actuation:	Fresh/salt water, surface to 20,000 feet
Radiation Pattern:	Rated output over 80% of sphere
Size:	1.3" diameter x 4" length
Weight:	Less than 9 oz. (12 oz. with mounting kit)

b. The Underwater Acoustic Locator System is the Dukane Model N30A5A (Figure 22), which consists of a Model N15A235A Underwater Acoustic Receiver and accessory items which permit use of the receiver from a small boat or underwater. Pertinent specifications for the receiver are:

Frequency Range:	Continuously tunable from 30 to 45 kHz
Power Source:	Battery, providing in excess of 50 hours of normal operation
Operating Temperature:	0°F to +130°F
Storage Temperature:	−65°F to +140°F
Size:	4.5" diameter x 9" length
Weight:	5 lbs. (in air)

The receiver is a portable transistorized, hand held device. It is designed for use in conjunction with an underwater sound source

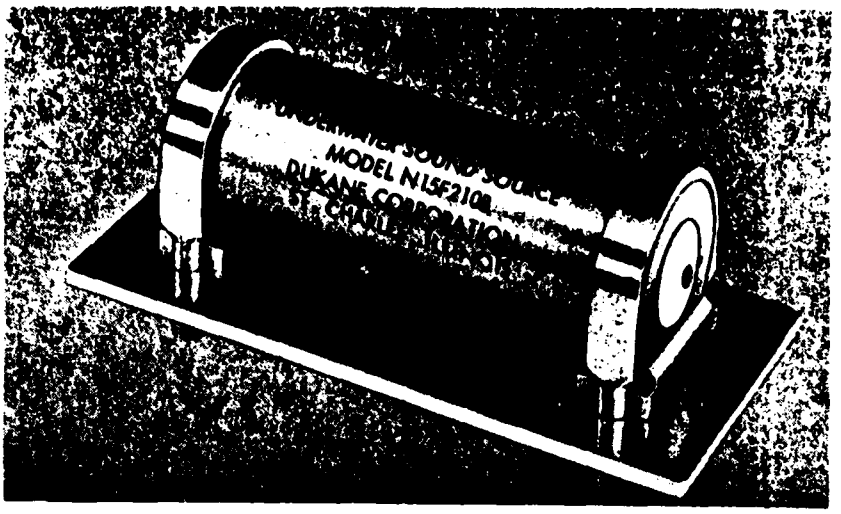


FIGURE 21 Dukane Model N15F210B Underwater Acoustic Beacon ("pinger").

emitting a signal in the 30–45 kHz range. With a sound source of this type (Dukane "pinger" Model N15F210B for Coast Guard aircraft) attached to submerged hardware, the directional characteristics of the receiver provide rapid bearing determination. The receiving transducer is removable and may be attached to an extendable support rod for use from a boat during preliminary search operations. When the maximum signal area is located, the receiver is reassembled for use by a diver in pin-pointing the "target".

0915 Underwater Locating Procedures

The Underwater Crash Location Detail using the Locator System in accordance with these search procedures should insure that the "search" boat is able to accurately plot its position at each listening point, or sufficient buoys must be available to mark the listening points. Unless these points can be plotted/marked it will be extremely difficult to conduct the search pattern adequately. Datum shall be determined in accordance with procedures outlined in Chapter 8 of the basic manual. After datum has been determined and the search plan (Figures 23 thru 26) selected by the SAR Mission Coordinator (SMC), the Underwater Crash Location Detail should conduct the acoustic search using the following procedures:

a. *At Datum (Point A)*—On arrival, buoy the spot. Shut down engine. Put receiver hydrophones over the side, and follow procedure specified under "*Detection*." If a signal is detected, immediately proceed as specified under "*Localization*." While making this initial survey, search the water surface with binoculars for floating or awash wreckage. If wreckage is spotted investigate before proceeding.

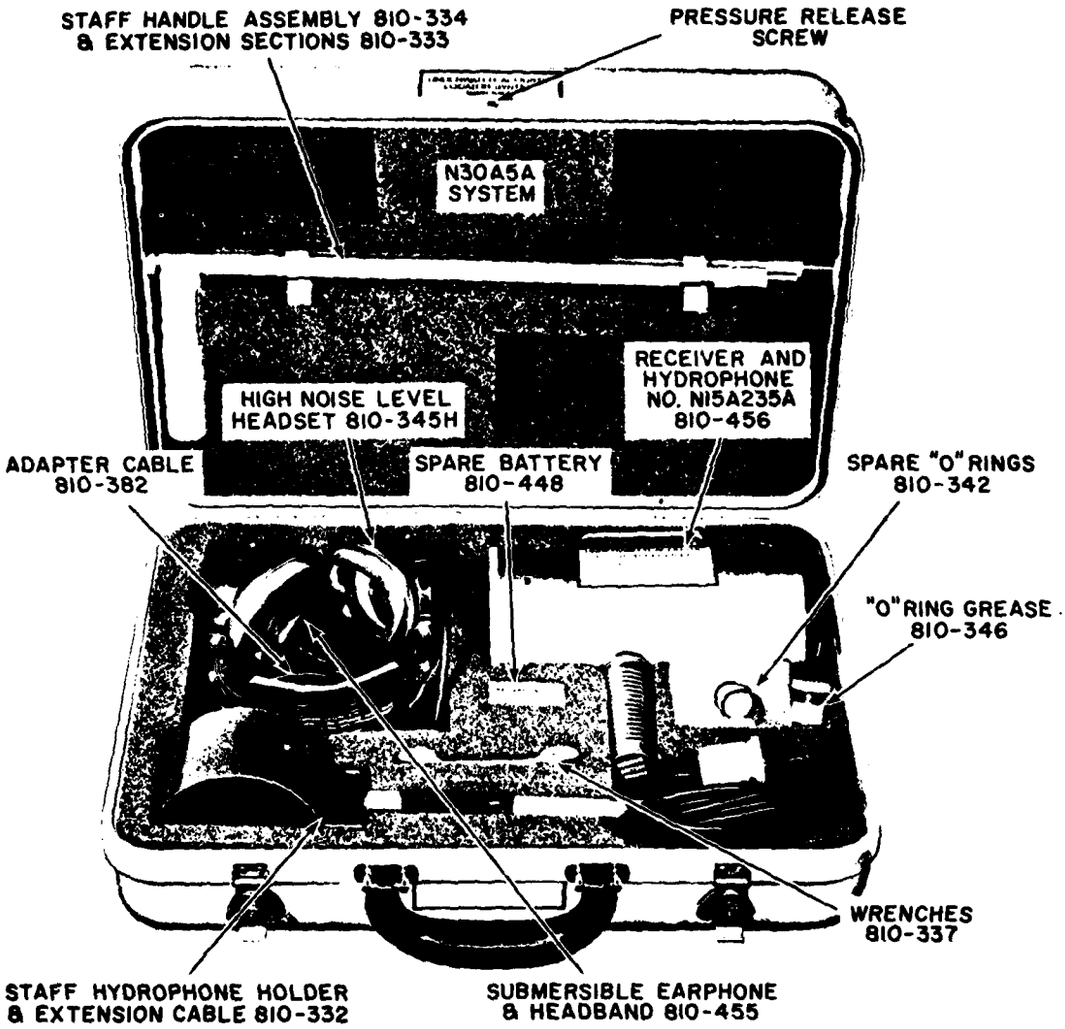


FIGURE 22 Dukane Model N30A5A Underwater Acoustic Locator System.

b. *Establish Listening Point Spacing*—See Figure 27. Drop test beacon, line, and buoy near point A. Get underway and run down the axis (sunken aircraft course) for a distance of one mile. Stop engine. Attempt to detect beacon buoy. If it is heard, proceed another mile and listen again. If it is not heard, reverse course for a half a mile. Listen again. Do this until the effective range of the test beacon is established in the search area. Use this range for spacing of the search plan that was specified to be used. Adjust frequency of the receiver for maximum indication at this time and note reference setting. Return and pick up the test beacon. Note: The best spacing to use will be developed in each area by experience.

c. *Search*—Start search in the same direction that the spacing test was conducted (to be sure the sunken craft's beacon had not been heard during the test and an erroneous spacing established). Using the specified search plan and the spacing arrived at, proceed to each listening point in alphabetical sequence. Follow the procedure specified under "*Detection*". Maintain a visual survey with binoculars. If timed runs are being made between listening points, buoy each point before proceeding. If accurate position location is possible, plot each listening point on the chart.

d. *Detection*—At listening point, with engine stopped, put hydrophone assembly in the water as deep as equipment and boat configuration will allow. Initially rotate slowly 360° with receiver set at reference setting. Repeat in 20° steps, swinging the frequency adjustment through its full range at each step. Repeat this procedure on opposite side of boat to prevent hull masking. Proceed to next listening point if pinging is not heard. If pinging is heard proceed with "Localization."

e. *Localization*—See Figure 28. Having detected pinging, the position must be established and buoyed. Stop the search plan. Rotate hydrophone for loudest signal. Run down this bearing line, stopping at one quarter spacing distances. Verify bearing before proceeding on at each quarter spacing distance. Buoy the position and proceed. Continue until signal bearing is reversed. Then proceed to a point one quarter spacing distance from general localization course. Take another bearing with hydrophones and follow this course. As you cross the line of buoys on the initial general localization course drop a buoy and stop. You should be over the beacon. The beacon will sound like it is coming from all directions when you are over it. Before diver goes in, slowly criss-cross the area with fathometer running (if available). In shallow water large objects will show up. This may reduce divers search time. Anchor and stop engines before putting diver in the water.

f. *Final Approach*—If sunken craft can be seen, the divers immediately check for life or body recovery. If it cannot be seen, the receiver is converted for diver use. The diver swims to the bottom, but not to exceed authorized diving limits. On the bottom, the beacon signal may be directional enough to swim up to within a few feet of it. After location is accomplished, a buoy line should be attached directly to the sunken craft. Divers shall be cautioned to exercise extreme caution if *sensitive or dangerous cargo* is involved.

g. *Salvage* — The On-Scene Commander (OSC) should arrange for the salvage group to take over on the scene. Divers should be transferred from one party to the other, if needed. The Underwater Crash Location Detail should be returned and be placed in a state of readiness again. Assistance should be requested to keep area clear of boat and ship traffic, if needed.

h. *Police the Area*—Remove all buoys from the water except the ones immediately around the salvage site. Comply with the appropriate Inland or International Rules for marking an underwater obstruction that is hazardous to navigation or in leaving markers.

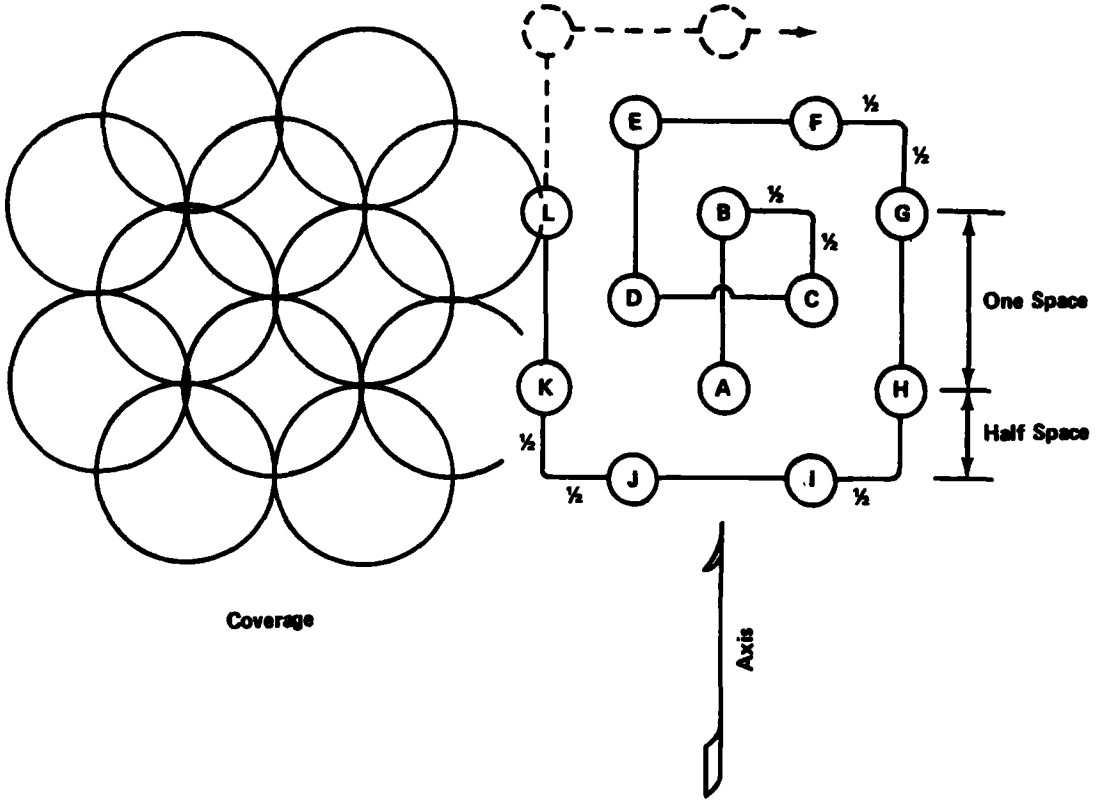
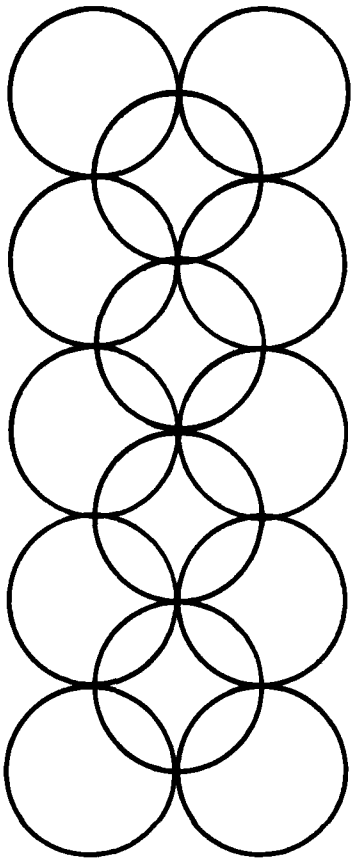


FIGURE 23 Search Pattern No. 1.



Coverage

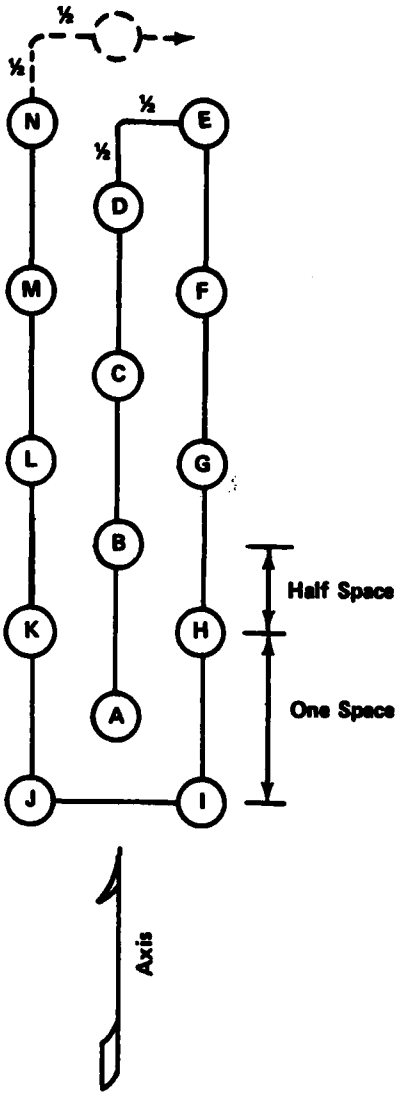


FIGURE 24 Search Pattern No. 2.

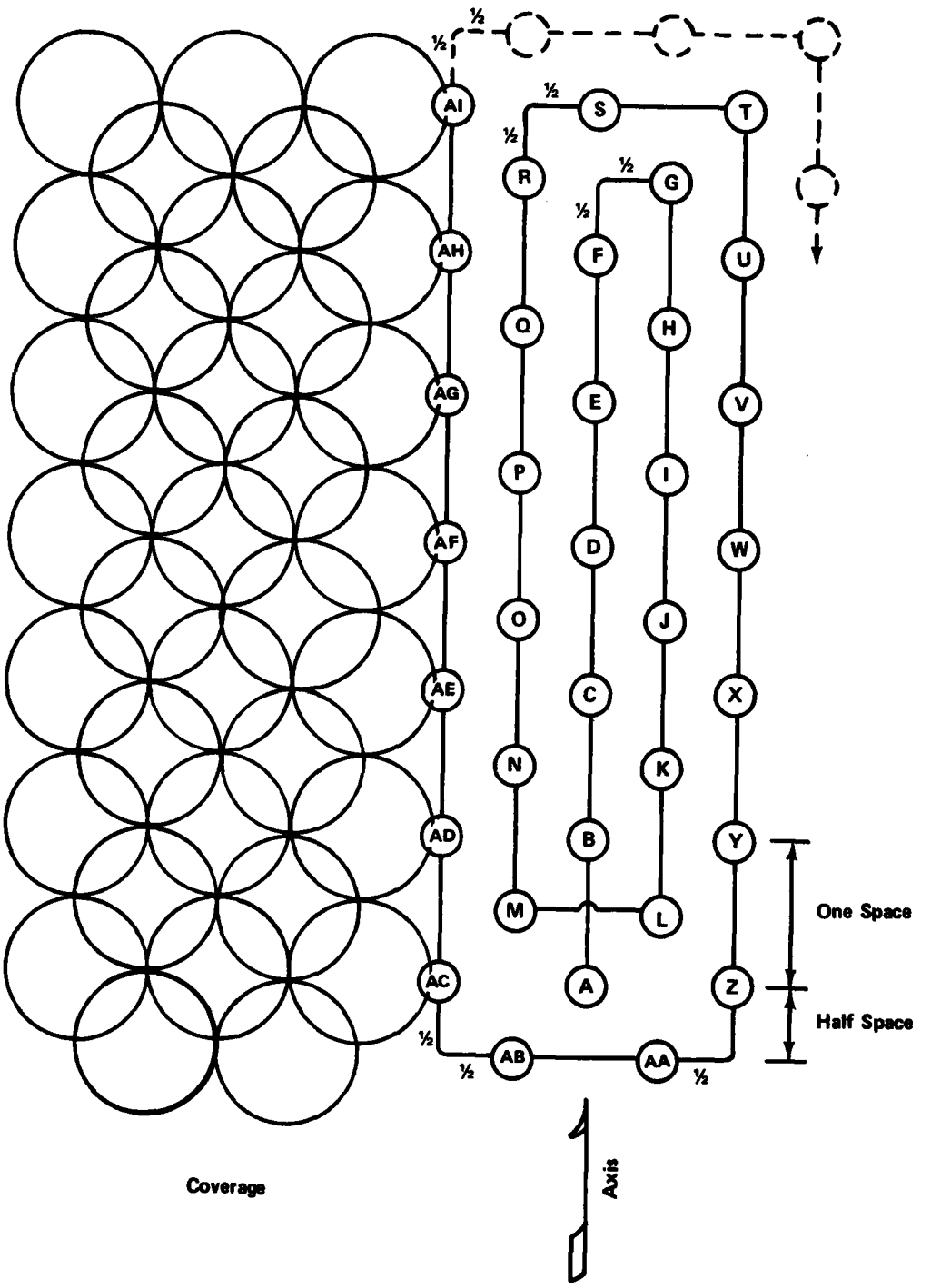
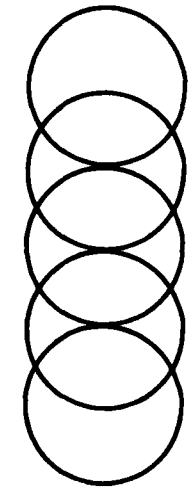


FIGURE 25 Search Pattern No. 3.



Coverage for Channel
8/10ths of Spacing

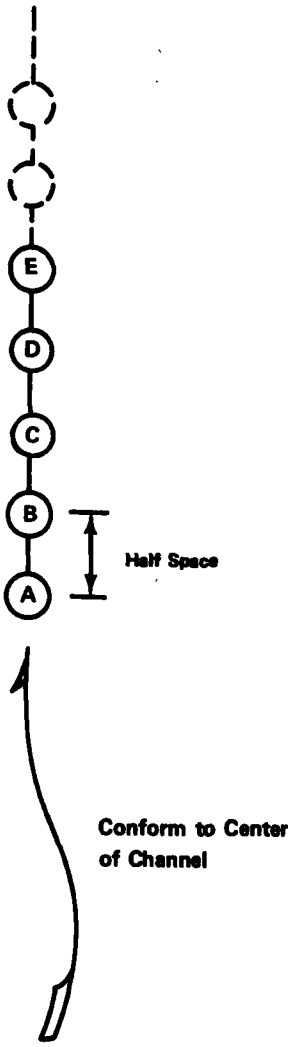


FIGURE 26 Search Pattern No. 4.

0920 Exercises

The Underwater Crash Location Detail shall be exercised occasionally to maintain proficiency. Exercises shall periodically be conducted at night. Exercises should be conducted by filling a water practice bomb or shape of comparable size rigged with a practice "pinger". The "pinger" can be dropped on a routine flight or from a vessel. An exercise message should be sent, and clearly indicate that an exercise is being conducted. The Underwater Crash Location Detail should not be alerted before the exercise message is received. The exercise commander then carries out the provisions of the local procedure/plan. The acoustic search should be conducted in accordance with this section. On conclusion, or soon thereafter, a debriefing and critique should be held. Practice should be scheduled to train new members and smooth out procedural problems. The practice "pinger" should be stored with the Locator System after refurbishment and battery replacement.

0925 Reports

A letter report shall be prepared detailing the experience encountered during each non-exercise search. The report should be submitted to Commandant (G–OSR–2) through the chain of command, with information copies sent to the other Underwater Crash Location Details to assist in their readiness. Exercises should not be reported, but records of times and difficulties should be made for review at readiness inspections.

0930 Correspondence

For further information, suggestions, corrections, and recommended improvements to this section, address correspondence to:

Commandant (G–OSR–2/73)
U.S. Coast Guard Headquarters
Washington, D.C. 20590

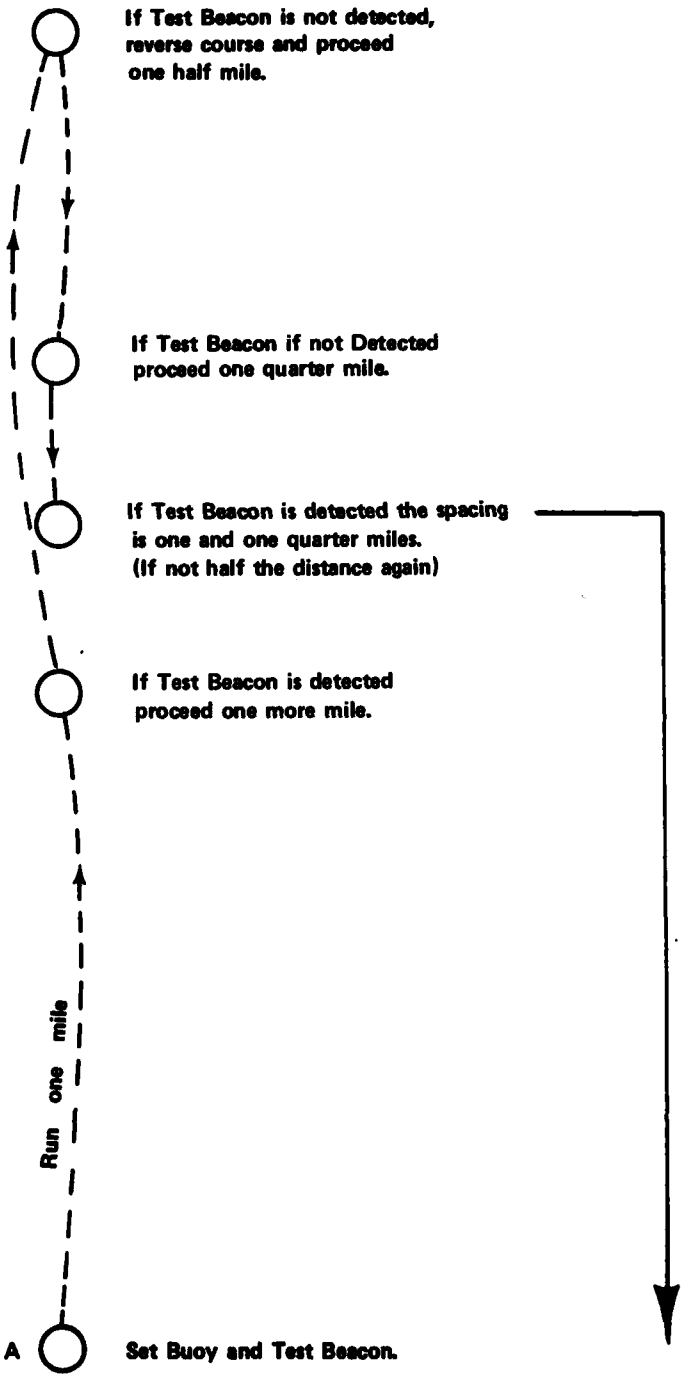


FIGURE 27 Establishing Spacing (at Datum).

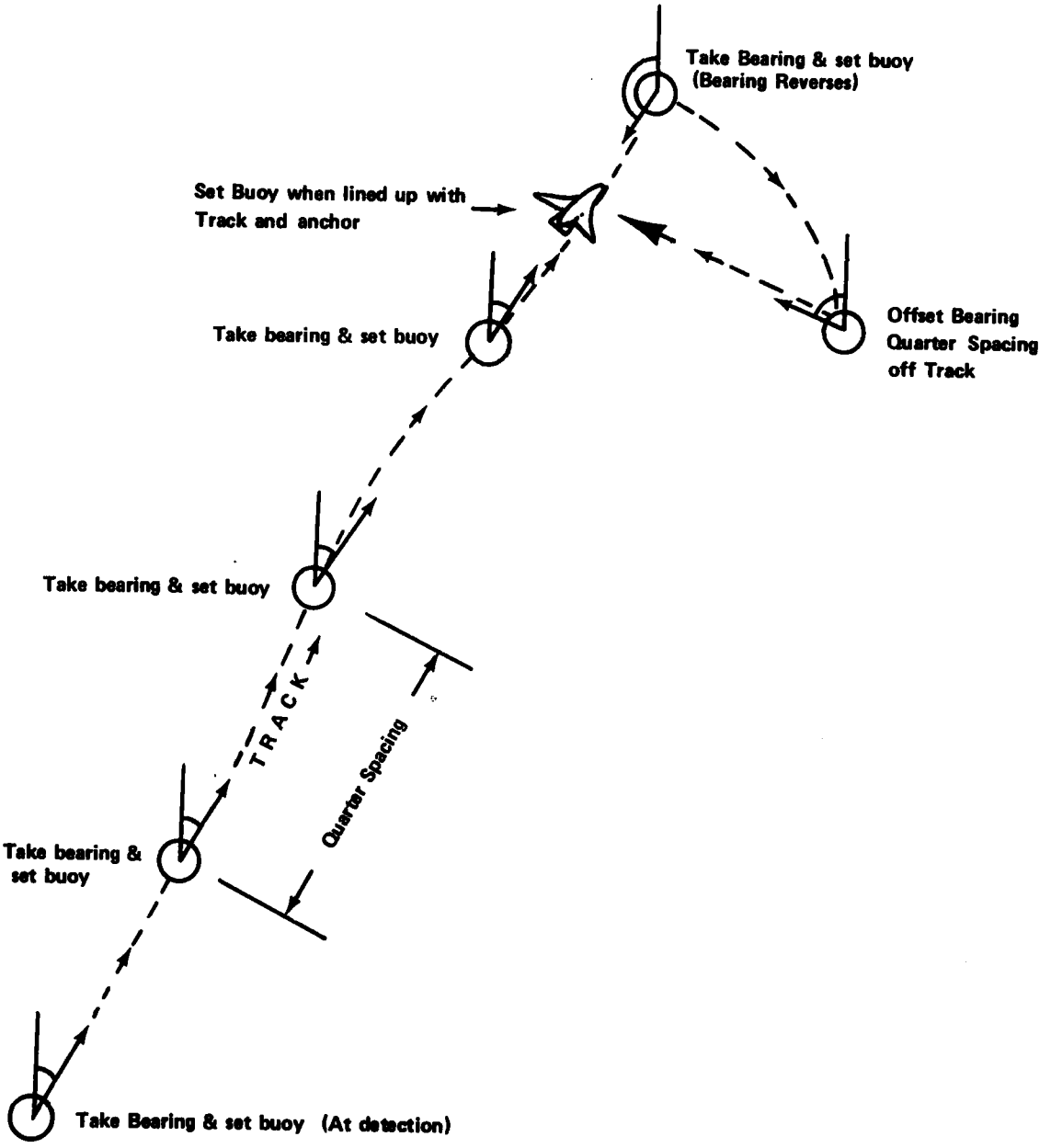


FIGURE 28 Localization.

Section 10. EMERGENCY MEDICAL SERVICE (EMS)

1000 General

While the primary orientation of Coast Guard Search and Rescue (SAR) is in the maritime area, under 14 USC 88 the Coast Guard may render aid to persons at any time and any place at which its facilities and personnel are available and can be effectively utilized. Incidents which involve the following are normally considered EMS incidents rather than SAR incidents encompassed by the National SAR Plan, although the SAR organization and facilities should be utilized for them to the maximum extent feasible:

a. Emergency evacuation of the injured from the highways;

b. Transfer of critically injured or ill persons from isolated locations to definitive medical care;

c. Evacuation of non-critically injured or ill persons from remote or inaccessible areas where surface transportation is not available or practicable;

d. Transfer of critically injured or ill persons from one medical care facility to another which is more capable of treating the particular case (see 1015); and

e. Emergency pick-up and delivery of medical supplies, equipment, blood, and human organs for transplant.

1005 Statutory Background

a. The Highway Safety Act of 1966, as amended, requires that States have a highway safety program developed in accordance with uniform standards promulgated by the Secretary of Transportation. Standard 11, "Emergency Medical Services", broadly outlines State EMS program requirements. Comprehensive EMS systems have been developed by the States and their political sub-divisions.

b. A number of DOT demonstration projects, funded under the Act of 1966, have shown that helicopters can be used very effectively in a civilian EMS system. However, economic constraints have prevented the rapid expansion of commercial and civil government helicopter ambulance services. To fill the void until these constraints can be overcome, the DOT proposed the interim use of military helicopters and service medics to respond to serious civilian medical emergencies. The MAST (Military Assistance to Safety and Traffic) program evolved as a cooperative effort of the Departments of Transportation; Defense; and Health, Education and Welfare.

c. The Emergency Medical Services System Act of 1973, administered by the Department of Health, Education and Welfare, was enacted to provide assistance and encouragement for the development of comprehensive area EMS systems.

1010 EMS Agreements

a. District commanders are authorized and encouraged to enter into agreements with State, county, or local officials providing for mutual cooperation and coordination of available facilities for providing emergency medical services. Such agreements shall take into account, inter alia, the following considerations:

(1) It shall be understood that Coast Guard facilities have their primary mission in the maritime areas and that response to requests will be made on an "operations permitting" basis.

(2) The agreement should provide for the designation of which agencies or officials will request the assistance; that requests will be limited to serious cases in which the use of Coast Guard facilities appears to be the

most feasible means of providing the required assistance, and that competition with private ambulance services, including air ambulances, will be avoided.

(3) There should be an understanding that should an aircraft be dispatched in response to an emergency medical request the pilot will be the final judge of the feasibility of carrying out the mission and will be responsible for discontinuing it if, in his opinion, it cannot be accomplished safely.

(4) Any agreements developed under this Instruction should be titled "Emergency Medical Service Agreements" rather than "SAR Agreements".

b. Operational commanders may impose further requirements as they deem appropriate in developing agreements in their particular areas. The sample agreement, Appendix A hereto, may be used as a guide. Copies of any agreement developed under this section should be forwarded to the Commandant (G-OSR) and (G-CMA).

1015 Air Transportation Between Medical Facilities

Criteria for the use of Coast Guard aircraft for the emergency transfer of critically ill or injured patients into and between Veterans Administration hospitals has been developed and should be used as a guide for all requests for such transfers between other medical facilities as well. These criteria are:

a. Suitability and availability of aircraft;

b. Non-impairment of the primary missions and training;

c. The emergency is genuine and involves actual lifesaving or reduction of disability;

d. Non-competitive with available and adequate commercial air ambulance service;

e. Need for such emergency movement based on medical decisions;

f. Trained health care personnel to be provided by the requesting medical personnel in accordance with needs and circumstances.

Appendix A to Section 10

EMERGENCY MEDICAL SERVICES AGREEMENT

between

The Governor of the State of _____

and

The Commander, _____ Coast Guard District

Date

1. Purpose:

This agreement provides a means of mutual coordination between the two signatories for the utilization of available facilities for rendering aid to persons in need of emergency medical services.

2. Scope:

This agreement is the basis for mutual cooperation for utilization of communication and transportation facilities in support of emergency medical services under the National Highway Safety Act of 1966 and the Emergency Medical Services Systems Act of 1973 within the State of _____.

3. General:

The National Highway Safety Act of 1966 requires States to implement comprehensive safety programs for the protection and preservation of life on public roadways within their respective jurisdictions. The program must be developed in accordance with uniform standards promulgated by the Secretary of Transportation. Standard 11, "Emergency Medical Services" (EMS), broadly outlines State EMS program requirements. Comprehensive EMS programs have been developed by the States and their political sub-divisions.

The Emergency Medical Services Systems Act of 1973 was enacted to provide assistance and encouragement for the development of comprehensive area EMS systems.

The U.S. Coast Guard provides rescue facilities for the promotion of safety on and over the high seas and waters under the jurisdiction of the United States. It is understood that the primary mission of these facilities is maritime search and rescue and that response to requests from State and local authorities will be made on an operations permitting basis only. It is further understood that this agreement is "interim" in nature, intended only to fill a void until adequate commercial or civil government helicopter ambulance services become available.

4. Organization:

The Governor of the State of _____, through his designated Highway Safety and Emergency Medical Service Representatives, will work in coordination with the Commander, _____ Coast Guard District to implement the terms of this agreement. Within the framework of this agreement, direct liaison between local Coast Guard commanders, local law enforcement agencies and other emergency medical services coordinators is authorized.

Appendix A to Section 10—Continued

5. Agreement:

It is agreed that:

a. Law enforcement agencies or other designated emergency medical services coordinators within the State of _____ may request assistance from commanding officers of Coast Guard units to provide emergency medical transportation services within the scope of the Highway Safety Act of 1966 and the Emergency Medical Services Systems Act of 1973. Such requests will be limited to serious incidents in which Coast Guard facilities appear to be the most feasible means of providing the required assistance. Competition with private ambulance services, including air ambulance services, shall be avoided.

b. Commanding officers of Coast Guard units may respond to requests for assistance when such response can be made without interfering with the primary mission of maritime search and rescue.

c. The pilot in command of any Coast Guard aircraft dispatched pursuant to this agreement shall be the final judge of the feasibility of the mission and shall be responsible for discontinuing the mission if, in his opinion, it cannot be accomplished safely.

d. Prior to the implementation of this agreement, Coast Guard commanders shall apprise those agencies or officials designated to request EMS assistance of the capabilities and limitations of Coast Guard helicopters and other facilities likely to be used for assistance.

_____	_____
Governor	Rear Admiral, U.S. Coast Guard
	Commander,
State of _____	
	_____ Coast Guard District

Section 11. RESCUE BY MARINE CRAFT

1100 Rescue By Ship—General

Rescue methods employed by ships may vary considerably according to their size and the circumstances in which the operation takes place. It is likely that the condition of the survivors will be such that they are unable to help themselves. Specialized SAR ships should be prepared to hoist survivors without expecting any effort on the survivors' part.

1101 Rescue Methods

A number of methods for rescuing survivors by ship's personnel are presented here for guidance. The situations are grouped into three categories: rescue from the water; rescue from a foundering ship; and rescue from a burning ship.

1102 Rescue Ship Preparations

Rescue ship stations that may be manned or augmented during rescue operations are: bridge, lookout positions, boarding station, receiving station, and rescue boat.

a. *Bridge.* If available, a portable loud hailer should be made ready for giving instructions to survivors, boats and ship's personnel at the boarding station and elsewhere on deck. A portable transceiver radio is desirable for direct radio contact with deployed boats.

b. *Lookout Positions.* Extra lookouts should be assigned when circumstances dictate in order to keep rafts or survivors in sight. Special lookouts with rifles may also be posted as a shark watch. These are usually positioned on the flying bridge, but when the ship is rolling excessively it is advantageous to have a second shark watch stationed at the boarding station.

c. *Boarding Station.* It is desirable that the boarding station be located in the forward one-third of the ship, as near the bridge as possible. This will give the conning officer an unobstructed view of the rescue operation and make it easier to maneuver. It will also lessen the possibility of the main induction system ingesting lines or parachutes which may be attached to survivors.

A rescue swimmer and his safety-line tender should always be stationed at the boarding station regardless of which rescue method is being used.

The boarding station should have all equipment necessary to bring the survivors from the sea to the deck. The equipment may include: embarkation nets or rescue-at-sea ladders, Jacobs ladders, portable davit or other hoisting equipment, rescue sling, rescue basket and/or rescue net, portable flood light, line throwing gun, grapnel and line, kapok heaving line, cutting tools such as wire cutters, pruning shears, sharp knives, Stokes Litters, blankets, survivor processing kits, and emergency medical kits.

Where large numbers of survivors are involved, it may be desirable to rig a large rubber life raft alongside the boarding station to act as a platform from which the final step in bringing the survivors aboard can be more easily effected. If the life raft is canopied, the canopy should be cut away for this purpose. Care should be used not to puncture any tubes when cutting away the canopy.

d. *Receiving Station.* A receiving station is a compartment, or other location, to which survivors are taken immediately after rescue. Is is here that they should receive first care. Medical personnel should be assigned, if available to sort the survivors according to their injuries, so that all available medical care can be used effectively.

e. *Rescue boats.* The ship's small boats should be manned and made ready at the onset of any rescue attempt even though their use is not expected. They should be equipped similar to a boarding station as described in 1102c, including a rescue swimmer and safety line-tender. The coxswain should be familiar with boat rescue methods.

When a number of disabled or exhausted survivors needs to be brought aboard, lowering a boat and placing them in it, and then hoisting the boat back aboard may be the best way to do so.

1103 Rescue Swimmers

Rescue swimmers should be selected from among the best swimmers on board. They should be strong enough and skilled enough to be able to tow an unconscious person through the water without the aid of any flotation equipment. The swimmer should be outfitted with a wet suit, sharp knife, light weight swimmer's harness, and 150 feet of light weight 900 pound test nylon safety line.

The main purpose of the knife is to permit the swimmer to free himself from any entanglement with lowering lines, parachute shroud lines, or other similar hazards.

The safety line attaches to the swimmer's harness and should be sufficiently strong to enable both the swimmer and the survivor to be pulled back to the ship, if necessary. The line should be tended at all times, preferably by a man dressed for, and assigned as, a back-up rescue swimmer.

Personal flotation devices should not be worn under these circumstances. They will only impede, and possibly prevent, a successful rescue by the swimmer.

The swimmer should have a good knowledge of swimmer rescue techniques. It is highly desirable that he be familiar with the techniques of giving mouth-to-mouth resuscitation and/or cardio-pulmonary resuscitation in the water. Familiarity with the various types of survival equipment worn, or used by, maritime and aviation personnel is also desirable.

1104 Rescuing Survivors From The Water

(under development)

1105 Rescuing Survivors From A Distressed Ship Which Is Foundering

a. *Ship to ship/direct.* This method requires the rescue ship to come close alongside and contact the distressed ship. Survivors then jump, climb or swing aboard directly from the deck of the distressed ship to the deck of the rescue ship. This method can usually only be used when the sea conditions are relatively calm. Consideration has to be given to the strength and condition of the distressed ship's hull, in case hard impact between ships occurs. When conditions are favorable, the rescue ship takes position to one side of the wind line that is blowing over the distressed ship, and maneuvers to the same heading as the distressed ship. The rescue ship then stops engines and carefully observes the relative drift between the two ships. This is necessary in order to determine the best approach.

Usually the most favorable approach can be made on either the lee bow or the lee quarter of the distressed ship. There are several advantages to using this approach. It usually provides the survivors with the easiest possible means of getting from the deck of their ship to the deck of the rescue ship since relative deck heights are usually less at these positions. There is normally less debris, line, cables, booms, etc., hanging over the side of these areas. These can be especially hazardous to a rescue ship when making its approach and must be looked for in all rescue attempts. Debris and cables can easily foul a ship's propellers, while booms and other rigging that have broken loose from the distressed ship's deck can cause serious damage to the rescue ship should they strike it. Because of the angle of the approach on the lee bow or quarter, the rescue ship's stern is usually clear for maneuvering and backing down. A different approach is used if the distressed ship is burning. This is discussed in section 1106.

After the approach has been determined, the rescue ship proceeds to ease its bow up against the hull of the distressed ship, and holds it there with necessary throttle until all survivors have been transferred. The rescue ship should place mattresses on the deck at the location where the survivors are coming aboard. This helps to minimize injuries that might otherwise result due to jumping aboard.

This method should not be attempted if doubt exists as to the safety of the rescue ship or her crew. If doubt does exist, consider other methods.

b. *Ship to ship/raft haul.* The use of rubber rafts or rubber boats for the removal of survivors from a foundering ship can be the safest and most effective method when heavy weather is present. Rubber rafts have been used many times to successfully remove entire crews from distressed ships. The greatest advantage in using rubber rafts or rubber boats is that they can be safely used close alongside a ship in heavy seas without damaging them or the ship, or injuring the occupants. The raft haul method requires two seven-man, or larger, rubber rafts (Zodiac or Avon rubber boats may be substituted when available), two suitable lengths of three inch nylon line, and a line throwing gun. When preparations are complete, the rescue ship makes its approach. The approach must be made in such a manner that a safe interval between ships can be maintained while the rescue operation is in progress. When the rescue ship reaches a suitable position, and is able to maintain it, a messenger line is passed to the distressed ship by means of the line throwing gun. Both of the three inch nylon hauling lines are secured to one raft. The other end of one hauling line is made fast to the messenger line previously passed to the distressed ship. This line is then pulled over to the distressed ship by her crew. The second hauling line attached to the raft is tended by the crew of the rescue ship. The raft can now be hauled back and forth between ships until all the survivors have been transferred. *Raft canopies must not be rigged for this operation.* If necessary, the canopy should be cut away, leaving the canopy support members unharmed. The reason for these precautions is that survivors must be able to enter and leave the raft with ease.

The second raft, also without canopy, is used as a boarding platform. It should be rigged and moored alongside the rescue ship boarding station outboard of the embarkation net or ladder.

On each return trip the transfer raft is hauled up alongside the boarding platform where the survivors can be readily assisted aboard. The transfer raft is hauled back to the distressed vessel for the next load of survivors.

This method can also be used effectively for transferring dewatering pumps, or other essential supplies when conditions are too severe to attempt a ship-to-ship method or a launching of the rescue ship's small boats.

c. *Ship-to-ship/raft drift.* If the weather and sea conditions will not permit maintaining a stable and constant separation between vessels, the use of a free drifting raft, without canopy, may be in order. This method is feasible only if the raft drifts at a greater rate than the distressed ship; with some newer ballasted rafts this may not be the case. If uncertainty exists on this point, a test of relative drifts can be made. If the distressed ship drifts significantly faster than the raft, it may be possible to reverse the procedure and allow the distressed ship to drift down on the raft.

When the raft is drifted downwind to the distressed ship, it will be against the windward side. The crew of the distressed ship should then be instructed to snag a buoyant trail line attached to the raft with a boat hook or grapnel. The raft can then be hauled around to the lee side of the distressed ship where the survivors can abandon ship more safely. Once the survivors are all aboard the raft, the trail line is released and the raft is maneuvered clear of the distressed ship's lee side. When it is a safe distance from the distressed ship, the rescue ship can maneuver to a position just upwind with engines stopped. When the raft is safely in the lee of the rescue ship it can be brought alongside after throwing kapok heaving lines to the occupants. Once alongside,

personnel are assisted aboard at the boarding station. *If the possibility exists that the survivors on the distressed ship will have difficulty in initially recovering the drifting raft, a line throwing gun should be used to place a raft recovery line in the hands of the distressed crew.*

A variation of this method is to use one hauling line attached to the raft and tended by the rescue ship's crew. The hauling line is kept slack while the raft drifts to the distressed ship and until the raft drifts clear of the ship after boarding by the survivors. The line is then used to haul the raft to the rescue ship.

Another variation of placing a raft alongside a distressed ship is to tow it astern of the rescue ship, and place it alongside the distressed ship and then stop in such a manner that the raft drifts to the side of the distressed ship. When the raft gets alongside, the rescue ship's crew lets go of the tow line and it is packed up by the distressed ship's crew with a grapnel or boat hook.

d. *Ship to ship/small boat.* The rescue ship's small boats can be very effective for removing survivors from the distressed ship. The usual limiting factors are weather and sea conditions. However, the sea-keeping qualities of most rescue boats and lifeboats is generally sufficient to enable them to withstand just about any type of sea conditions, provided that they are handled properly. The hazards involved in launching and retrieving small boats in heavy weather is usually what prevents their use. Launching boats in heavy weather can result in a boat being smashed against the hull of a rolling ship. Retrieval of a small boat is even more hazardous to the boat and its occupants.

The boat's maneuverability should be compared to motions of the distressed ship and given careful consideration. The inability to maneuver quickly could result in the boat becoming pinned against the hull of the distressed ship and ultimately smashed apart or lifted by the sea to the deck of the ship. See section 1113 on rescuing survivors from ships by boat.

After the removal of survivors from the distressed ship, the loaded boat should proceed to the lee side of the rescue ship and survivors should be brought aboard at the boarding station or hoisted aboard with the boat. If rafts are used during the rescue, and transferring survivors from the raft to the boat is considered too hazardous, the raft should be towed astern of the boat and moored alongside the boarding station on the lee side of the rescue ship. Removal of survivors to the ship can then be accomplished.

1106 Rescuing Survivors From A Burning Ship

When rescuing survivors from a burning ship, remember that the urgency of the situation is compounded not only by the fire but also by the possibility of explosion. The survivors have to be removed as quickly as safety permits. Normally, the approach to a burning ship is from upwind. This will keep the rescue ship clear of smoke, flame or sparks that could seriously hamper the rescue attempts.

Before approaching, the rescue ship should break out all fire fighting equipment, including extinguishers, fire hoses, portable fire pumps, etc. The pumps should be operating, all hoses should be led forward and pressure should be placed on them.

Surface craft which are not equipped with portable fire pumps or built-in fire fighting systems should not attempt to approach a burning vessel too closely. They should approach as close as is safe and then direct the people on board to put on life jackets and jump overboard on the windward side of the burning ship. The burning ship will drift downward away from the survivors in the water and the rescue ship will then be able to rescue them from the water.

When the rescue ship is equipped with portable fire pumps and/or built-in fire fighting systems, it may be possible to remove the survivors by placing the bow of the rescue ship against the hull of the burning ship. Before this is attempted the rescue ship must string extra fenders and whatever other extra padding is available (e.g., life jackets, cushions, mattresses, etc.) on a line and hang these over the bow to serve as a bow fender. The bow

of the rescue ship will be the contact point with the side of the ship on fire.

The approach should be made on the upwind side. Fire hoses should be directed in such a way as to suppress the flames and cool deck areas that survivors must transit. High pressure steady stream water should not be directed against vertical surfaces of the burning ship. This could cause the ship to drift away from the rescue ship. It might also cause a weakened hull to break up or cause injury to the survivors. The primary concern is the safe removal of the survivors—not extinguishing the fire. Contact with the burning ship's hull should be in the vicinity of the bow or stern and head-on. The rescue ship's bow should be eased up to the selected point of contact; after that a slight increase in throttle will be all that is required to hold the ship's together until the survivors are rescued.

Care should be taken during the approach to keep the wind dead astern. Should the rescue ship angle off the wind, the wind could cause the rescue ship to come broadside to the burning ship when contact is made. This should be avoided at all cost; otherwise the rescue ship may have great difficulty in getting away from the burning ship. Always allow for a quick retreat.

With the ships together, the removal of survivors should be accomplished with all possible speed. Then, the rescue ship should back away and leave upwind from the burning ship.

After survivors have been safely rescued, and if their condition permits a delay in transporting them to a safe delivery point, an attempt to extinguish the fire may be made.

1110 Rescue By Boat—General

When survivors are located in lakes, sheltered waters, rivers, or coastal areas, rescue will often be made by fast boats of limited range based close to the distress scene. When survivors are in deep water, large ships may launch their small boats to complete a rescue. Since boats are generally small in size and may not be able to take all survivors on board at one time, a sufficient number of them should be dispatched to the distress scene. If this is not possible, each boat should carry rafts so that those survivors which cannot be taken aboard immediately can either be towed to safety in the rafts, or kept afloat in them while they await their turn or the arrival of another boat. If survivors must be left behind, rescue boat crews should insure that they are made as secure as circumstances permit.

1111 Rescue Boat Preparation

In general, rescue boats are much more limited in rescue equipment than rescue ships. However, since a rescue boat is essentially a floating boarding station, its equipment should parallel that of a rescue ship's boarding station. If the boat is a multi-purpose boat, a special rescue kit can be made up for placement on the boat during rescue missions.

Equipment may include portable radio transceivers, grapnels and line, survivor lifting line with rescue sling, cutting tools, tools for extracting survivors from wreckage, blankets, survivor processing kit, and a first aid or emergency medical kit. In situations where large numbers of survivors may be expected, inflatable rafts or inflatable rescue platforms should be carried to provide emergency flotation for those who cannot be taken aboard the boat.

Of special importance are survivor lifting lines. The lines may be made up of any size, although a 2½"–3½" circumference line is preferred. A rescue sling, bowline, or loop is tied or spliced into one end of the line. Lifting lines may be made up in advance or improvised from the boat's mooring lines at the time of rescue. If made up in advance, the loop or sling should be adequately padded to prevent rope burn or binding of the survivor while he is being lifted/assisted aboard. Lifting lines should be used in both swimmer-assisted and direct rescue of persons from the water. The lifting line makes the rescue a quicker, easier and safer operation. The lifting line will assist exhausted survivors in climbing the net or ladder of larger boats, or over the gunwale of small boats. It will prevent the survivor from falling backwards into the water while boarding the boat and will help prevent loss of the survivor at the last moment before rescue.

1112 Rescuing Survivors From The Water

(under development)

1113 Rescuing Survivors From Ships

a. *Ship-to-boat/direct.* This method can be used when sea conditions permit. The approach to the distressed ship should be made on its lee bow or lee quarter unless the ship is on fire. (In that case, procedures similar to those in section 1106 should be used.) The leeward side will provide smoother water and safer removal of the survivors. By making the approach angled to the bow or quarter, the rescue boat is provided with open water astern for maneuvering and backing down. The boat should approach the distressed ship only as close as it is safe to do so.

In some cases it may be possible for the distressed ship to rig a life raft alongside as a debarkation station. If it does, the canopy should be removed or cut away. In this instance the boat can come alongside the raft instead of alongside the ship.

Once alongside, the survivors can move toward the boat (or raft if used) by sliding down lines, by climbing down nets or by jumping into the water first. They should never be told to jump into the boat or raft from heights above 5 feet: they might injure themselves or might continue right through the bottom of a raft. When all survivors are aboard, or the boat is filled to capacity, the boat should back off until clear of the ship.

b. *Ship-to-boat/raft.* When a close approach by boat is too hazardous, the boat should use an inflatable rubber raft. The boat can then approach to a safe distance and float the raft, with a line attached, down to the distressed vessel. The raft canopy should not be rigged. When using this method a rescue swimmer and his line tender should be placed in the raft to aid in guiding it alongside the ship. The swimmer and his line tender assist the survivors as necessary. When all survivors have been embarked, or the raft is filled to capacity, the raft should then be towed to safety away from the distressed ship's side and the survivors transferred to the boat.

1114 Rescuing Survivors From Aircraft

If an aircraft remains afloat, there may be a possibility of towing it to a safe anchorage or into shallow water. However, the condition of the survivors is the prime concern and they should be removed to safety immediately. This holds true even though injuries are not apparent; there is always danger of shock. If there is a chance of saving the aircraft, additional units should be assigned to this task.

a. *Rescue from floating seaplanes or amphibians.* The following rules should be followed for boat approaches to a floating seaplane or amphibian:

(1) Before an approach is attempted, the boat operator should take a position in front of the aircraft and on the same heading. The boat should be stopped and a comparison should be made of the rates of drift. Normally the plane will drift faster than the boat and will take up a position heading into the wind.

(2) The approach to the aircraft should be made from such a direction that the difference in rate of drift will tend to separate the aircraft and the boat.

(3) In approaching an aircraft during any weather except the smoothest, the boat should *never go under the wing or tail.* If the motion of the aircraft is lively, damage to the aircraft and injury to the boat's crew would be likely to occur from such a maneuver.

(4) When it is necessary to go alongside the aircraft, plenty of fenders should be made ready for use. As a firm contact is likely to occur, the boat crew should help to cushion the contact by fending off by hand. A preferred method is to have the plane crew rig a rubber raft alongside, the boat going alongside the raft and survivors boarding the boat via the raft. The raft canopy should not be rigged.

(5) When conditions are too rough for a boat to go alongside the aircraft, the boat may stand off and personnel can be transferred by shuttle using a rubber liferaft and line. Again, the raft canopy should not be

rigged. A swimmer and tender should be placed in the raft to assist the survivors aboard as well as to insure proper handling of those who may be injured.

d. *Rescue from ditched aircraft.* In cases of ditching, it is extremely important that assistance arrive quickly to remove any injured persons from the plane, rafts, or water. The aircraft flotation is unknown and it must be assumed that it will be of short duration. Much will depend on the damage the aircraft sustained in the ditching. Boat crews involved in rescues from ditched aircraft should be aware of the following:

(1) Those survivors in rafts are in the safest position. Therefore, survivors in the water, survivors clinging to debris and survivors still aboard the aircraft should be rescued first.

(2) An aircraft that has ditched will usually be in a nose down position. The aircraft should be approached as expeditiously as possible in order to remove any personnel trapped inside. It may be necessary to break into the aircraft to release trapped personnel. Some aircraft have panels marked for emergency access which can be easily ripped out. Entry should never be attempted through emergency exits which are under water.

(3) Precautions must be observed to avoid igniting fuel spilled in connection with the ditched aircraft. Boats with internal combustion engines may reduce this hazard by approaching from the weather side to the edge of the fuel spillage and using a rubber liferaft shuttle or a swimmer to rescue survivors.

(4) In the event there is a fire, caution in approaching the plane must be exercised. The approach should normally be made by coming in on the weather side as close as is safe.

(5) First aid should be given to injured survivors. Rescue crews should include an Emergency Medical Technician (EMT) and they should carry emergency medical supplies. Because it is difficult to render definitive emergency care on a rescue boat, it may be necessary to set up a temporary station at a convenient point on shore when medical facilities are not close at hand.

1115 Coordinated Helicopter/Boat Rescue

See paragraph 977 of the basic manual which covers this situation.

LIST OF EFFECTIVE PAGES

Subject Matter	Page Numbers	Effective Pages
Title Page	i (Reverse Blank)	Original
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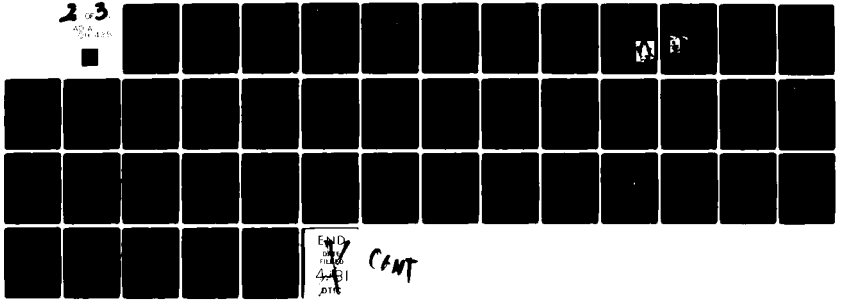

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15. Supplementary Notes

These changes go along with AD-A 081425

16. Abstract (Limit: 200 words)

This publication supplements the National Search and Rescue Manual by providing those procedures which are intended for Coast Guard only use.

Change 12

a. Adds Standard hoist briefing message.
b. Adds a requirement for ground escort of MEDEVAC aircraft
c. Adds new section on Rescue Swimmers.

Change 13

Revises Section 2 on the Search planningand search patterns for small units.

17. Document Analysis a. Descriptors

Search andRescue
Coast Guard
SAR
Rescue
Towing

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

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UNITED STATES COAST GUARD

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COMDTNOTE 16130
11 JUN 1980

COMMANDANT NOTICE 16130

CANCELLED: 31 December 1980

Subj: CH-12 to USCG Addendum to National SAR Manual (COMDTINST 16130.2-Old CG-308)

1. Purpose: This notice provides a change to subject addendum.

2. Discussion: This change provides the following revisions:

   a. Adds a standard hoist briefing message.

   b. Clarifies requirements on submission of DMB data form.

   c. Adds a requirement for ground escort of MEDEVAC aircraft.

   d. Revises the entire paragraph on Rescue Swimmers.

   e. Adds a new paragraph entitled "Rescuing Survivors from the Water by Ship"

   f. Adds a new paragraph entitled "Rescuing Survivors from the Water by Boat".

3. Action:

   a. Remove pages from the addendum (salmon colored pages) and replace with the enclosed replacement pages as shown below:

Remove Pages	Insert Change No. 12 Pages
vii	vii
ix (Reverse Blank)	ix (Reverse Blank)
1-6	1-6
	1-9 (Reverse Blank) (new page)

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B		4	25	1	79		75	2		*	3	26		125	2	1	1			3						
C	10*	5		*1	1		1		*1		1	1		1	1	1	1	1					1	1	1	*
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3. a. (Cont'd)

Remove Pages	Insert Change No. 12 Pages
5-3	5-3
10-2	10-2
11-2 thru 11-7 (Reverse Blank)	11-2 thru 11-9 (Reverse Blank)
LEP-1	LEP-1

b. Check the list of effective pages.

c. Make an entry in the Record of Changes.

B. F. HOLLINGSWORTH
Acting Chief, Office of Operations

Encl: (1) CH-12 to USCG Addendum to National SAR Manual (COMDTINST M16130.2 - Old CG-308)

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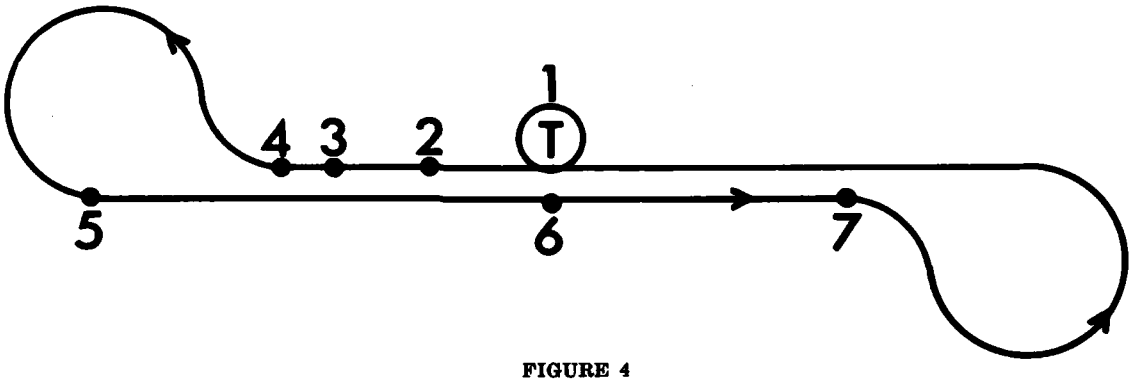

FIGURE 4

STANDARD PATTERN FOR RELOCATING SURVIVORS

1. Initial sighting—Drop drift signal.
2. Maintain heading, altitude, airspeed for 15 seconds.
3. Drop drift signal.
4. Make procedure turn to the right.
5. Make final turn to fly reciprocal track over markers.
6. When over marker #1, drop smoke float.
7. If target is not re-sighted, maintain heading for 30 seconds and drop a drift signal. Continue search utilizing the line of markers for reference.

Information concerning standard operating procedures and crew duties during hoist and aerial delivery operations are contained in the Flight Manual of each type of helicopter.

0145 Static Electricity Discharge Procedures

A helicopter in flight builds a static charge which must be removed prior to contact between any portion of the helicopter and an individual on the surface. During hoist or aerial delivery operations, the most effective method the hoist operator can employ to ground this electrical charge is to insure that the hoist equipment contacts the water or ground on the approach to the target. The "Dead Man's Stick" can be used by vessel personnel to discharge this electricity.

0150 Warning

WARN INEXPERIENCED PERSONS RECEIVING THE HOIST OF THE DANGER OF ELECTRICAL SHOCK.

0155 Use of the Rescue Sling (Figure 5)

The rescue sling may be used at any time when, in the opinion of the pilot, the use of the basket is inadvisable and the use of a litter *is unnecessary. At no time* should a survivor

FIGURE 5. Proper use of the Rescue Sling.

be hoisted with the sling unless he has been shown the correct manner in which it is to be donned. This includes the retainer straps being secured firmly around the individual prior to commencing the hoist. Military pilots have been trained in the rescue sling's use and therefore, no problems should be encountered in this respect.

0160 Use of the Rescue Basket (Figure 6)

The rescue basket shall be used in preference to the sling. Particular cases where use of the basket is indicated include:

a. Pick-up from a surface vessel,

b. Whenever the condition of a survivor indicates little or no self-help can be expected, and a platform pickup is infeasible,

c. Whenever injuries, especially of the chest or shoulder area, might be aggravated by use of a sling, or

d. When the person to be hoisted is not apt to be familiar with operation of the sling.

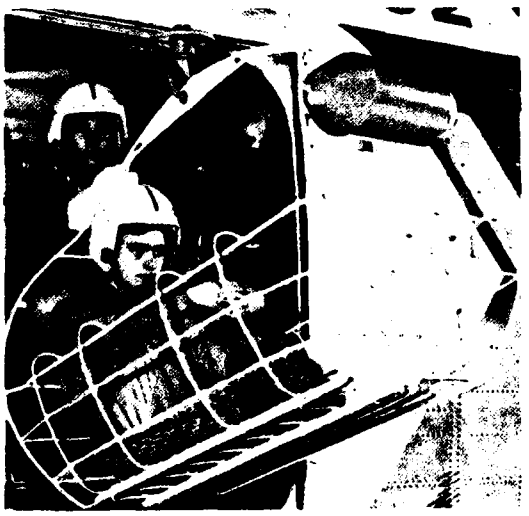

FIGURE 6. Proper use of the Rescue Basket.

0165 Use of the Stokes Litter (Figure 7)

The Stokes Litter should be used only when the condition of the patient is such that he must be in a prone position.

Prior to commencing the hoist, the hoist operator will insure that the litter securing straps and chest pad are utilized.

0170 Use of the Hoist for Medical Evacuation From the Surface

Either the rescue basket or Stokes Litter, as appropriate, may be used for hoisting a patient from the surface, or from a surface vessel. If the patient has serious injuries, is unconscious, or is in shock, the Stokes Litter should be used rather than the rescue basket. When possible, and medically indicated, it is preferable to lower a physician, corpsman, or EMT, to examine the patient prior to evacuation by hoisting. When the decision to hoist the patient is made, the vessel should be advised by any available means that the following procedures will be used (Appendix A to this section contains a suggested standard hoist briefing message for transmission to the vessel):

a. If possible, ground the basket/litter, to the vessel prior to personnel touching it.

b. The basket/litter, should be guided to the selected location on deck by the ship's crew, by means of the steadying line.

c. After the basket/litter, is on deck, it should be disconnected from the hoist cable, and the hook and cable guided clear of the rigging while being recovered by the helicopter.

d. The aircraft will move to one side and await the signal from the vessel that the patient is ready to be hoisted.

e. The patient should be made as comfortable as possible, and if conscious, should be informed of the instructions on the illustrated card attached to the basket or litter. If the patient's condition permits, make every effort to insure that the patient is wearing a personal flotation device.

f. Upon signal from the vessel, the aircraft will move back over the vessel and lower the hook, which should then be refastened to the basket/litter.

g. When the vessel is ready for the hoist, a "thumbs up" signal should be given to the aircraft.

h. Vessel personnel should tend the steadying line to prevent swinging.

If a steadying line is not used, eliminate steps b and h. Normally, the rescue basket,

Appendix A to Section 1

SUGGESTED STANDARD HOIST BRIEFING MESSAGE

To insure that a vessel will be adquately prepared for a hoist, the SAR Mission Coordinator, if in communication with the vessel, should send a briefing message as early as possible before the helicopter arrives on scene. The following is a sample which can be used:

"A COAST GUARD HELICOPTER IS ENROUTE TO YOUR POSITION. REQUEST THAT YOU MAKE THE FOLLOWING PREPARATIONS FOR HOISTING. LOWER ALL MASTS AND BOOMS THAT CAN BE LOWERED. PROVIDE A CLEAR AREA FOR HOISTING, PREFERABLY ON THE STERN. KEEP ALL UNNECESSARY PERSONNEL OUT OF THE WAY. WHEN THE HELICOPTER ARRIVES IN YOUR AREA, CHANGE COURSE TO PLACE THE WIND 30 DEGREES ON YOUR PORT BOW AND CONTINUE AT STANDARD SPEED. THIS MAY BE MODIFIED ON REQUEST FROM THE HELICOPTER PILOT. THE HELICOPTER WILL PROVIDE ALL OF THE REQUIRED EQUIPMENT. THE RESCUE DEVICE SHOULD BE GUIDED TO THE SELECTED LOCATION ON DECK BY THE SHIP'S CREW BY MEANS OF THE STEADYING LINE. ON EACH APPROACH, ALLOW THE RESCUE DEVICE TO TOUCH YOUR VESSEL, TO DISCHARGE ANY STATIC ELECTRICITY. IF THE RESCUE DEVICE HAS TO BE MOVED TO THE PERSON BEING EVACUATED, UNHOOK IT FROM THE HOIST CABLE. DO NOT MOVE THE RESCUE DEVICE FROM THE HOISTING AREA WITH THE HOIST CABLE STILL ATTACHED. IF THE CABLE IS UNHOOKED, DO NOT, I REPEAT, DO NOT ATTACH THE CABLE TO ANY PART OF YOUR VESSEL. FOR SAFETY THE HELICOPTER MAY MOVE TO ONE SIDE WHILE THE PATIENT IS BEING PREPARED FOR HOISTING. ENSURE THAT THE PERSON BEING HOISTED IS WEARING A LIFEJACKET, IF HIS CONDITION PERMITS. THE PATIENT SHOULD BE MADE AS COMFORTABLE AS POSSIBLE, AND IF CONSCIOUS, SHOULD BE INFORMED OF THE INSTRUCTIONS ON THE RESCUE DEVICE. UPON SIGNAL FROM YOUR VESSEL. THE AIRCRAFT WILL MOVE BACK OVER THE VESSEL AND LOWER THE HOOK. ALLOW THE HOOK TO TOUCH YOUR VESSEL TO DISCHARGE STATIC ELECTRICITY. THEN REFASTEN THE HOOK TO THE RESCUE DEVICE. WHEN THE VESSEL IS READY TO HOIST, A "THUMBS UP" SIGNAL SHOULD BE GIVEN TO THE AIRCRAFT. ENSURE THAT PERSONNEL ARE TENDING THE STEADYING LINE TO PREVENT THE RESCUE DEVICE FROM SWINGING EXCESSIVELY. DURING THE HOIST, STRONG GALE FORCE WINDS MAY BE DEVELOPED BY THE HELICOPTER. THESE WINDS MAY MAKE IT DIFFICULT TO STEER YOUR VESSEL. ENSURE THAT ALL LOOSE GEAR ON THE VESSEL IS SECURELY TIED DOWN. ATTEMPT TO CONTACT COAST GUARD RESCUE HELICOPTER *(NUMBER)* ON *(FREQUENCY)* AT *(TIME).*"

0550 Datum Marker Buoy (DMB) Data

A datum marker buoy drifts well with the sea surface current and provides an excellent description of the average surface current between position determinations. These current data are useful, not only for the specific SAR case during which the DMB is dropped, but also for on-going research projects involving the application of surface current to SAR, pollutant drift, and ice drift. It is in the national interest to keep a permanent record of this data. This shall be accomplished as follows:

a. Each aircraft and/or surface unit dropping a DMB for SAR or other operational purposes shall notify the controlling operations center (RCC) of the time and position of insertion.

b. Each aircraft and/or surface unit determining the subsequent position of any DMB which has previously been inserted by any unit shall advise the controlling operations center (RCC) of the new time and position.

c. The operations centers (RCCs) receiving the position information shall complete the DMB data form, CG-5111, figure 20a, after each operation in which DMBs are used. A separate form shall be used for each DMB employed.

d. Surface wind speed, if available, should be noted, with time and position of observation, on the reverse of the card.

e. Operations Centers (RCCs) should submit to the Coast Guard Oceanographic Unit only those cards meeting the following criteria:

(1) Both original and final positions are available.

(2) Complete time data (date, time (Z), month, and year) is available. This data should be presented in DTG format, e.g. "181930Z AUG 79."

(3) Total drift time is 12 hours or greater.

f. The completed forms should be mailed within one week after the operation.

DEPARTMENT OF TRANSPORTATION
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Front

DATUM MARKER BUOY DATA			
DISTRICT:		CASE NO.:	
	LATITUDE	LONGITUDE	DATE/TIME (Z), MONTH/YEAR
ORIGINAL DATUM POSITION:			
INTERIM POSITIONS:			
FINAL POSITION:			

INSTRUCTIONS: Make initial entry when datum marker buoy is deployed. Make additional entries for relocations at minimum time interval of about six hours. The final position is the last known position. Mail the card when this position is entered.

DEPT. OF TRANSP., USCG, CG-5111 (1-77)

Back

FIGURE 20a. DMB Data Form

Section 10. EMERGENCY MEDICAL SERVICE (EMS)

1000 General

While the primary orientation of Coast Guard Search and Rescue (SAR) is in the maritime area, under 14 USC 88 the Coast Guard may render aid to persons at any time and any place at which its facilities and personnel are available and can be effectively utilized. Incidents which involve the following are normally considered EMS incidents rather than SAR incidents encompassed by the National SAR Plan, although the SAR organization and facilities should be utilized for them to the maximum extent feasible:

a. Emergency evacuation of the injured from the highways;

b. Transfer of critically injured or ill persons from isolated locations to definitive medical care;

c. Evacuation of non-critically injured or ill persons from remote or inaccessible areas where surface transportation is not available or practicable;

d. Transfer of critically injured or ill persons from one medical care facility to another which is more capable of treating the particular case (see 1015); and

e. Emergency pick-up and delivery of medical supplies, equipment, blood, and human organs for transplant.

1005 Statutory Background

a. The Highway Safety Act of 1966, as amended, requires that States have a highway safety program developed in accordance with uniform standards promulgated by the Secretary of Transportation. Standard 11, "Emergency Medical Services", broadly outlines State EMS program requirements. Comprehensive EMS systems have been developed by the States and their political sub-divisions.

b. A number of DOT demonstration projects, funded under the Act of 1966, have shown that helicopters can be used very effectively in a civilian EMS system. However, economic constraints have prevented the rapid expansion of commercial and civil government helicopter ambulance services. To fill the void until these constraints can be overcome, the DOT proposed the interim use of military helicopters and service medics to respond to serious civilian medical emergencies. The MAST (Military Assistance to Safety and Traffic) program evolved as a cooperative effort of the Departments of Transportation; Defense; and Health, Education and Welfare.

c. The Emergency Medical Services System Act of 1973, administered by the Department of Health, Education and Welfare, was enacted to provide assistance and encouragement for the development of comprehensive area EMS systems.

1010 EMS Agreements

a. District commanders are authorized and encouraged to enter into agreements with State, county, or local officials providing for mutual cooperation and coordination of available facilities for providing emergency medical services. Such agreements shall take into account, inter alia, the following considerations:

(1) It shall be understood that Coast Guard facilities have their primary mission in the maritime areas and that response to requests will be made on an "operations permitting" basis.

(2) The agreement should provide for the designation of which agencies or officials will request the assistance; that requests will be limited to serious cases in which the use of Coast Guard facilities appears to be the

most feasible means of providing the required assistance, and that competition with private ambulance services, including air ambulances, will be avoided.

(3) There should be an understanding that should an aircraft be dispatched in response to an emergency medical request the pilot will be the final judge of the feasibility of carrying out the mission and will be responsible for discontinuing it if, in his opinion, it cannot be accomplished safely.

(4) Any agreements developed under this Instruction should be titled "Emergency Medical Service Agreements" rather than "SAR Agreements".

b. Operational commanders may impose further requirements as they deem appropriate in developing agreements in their particular areas. The sample agreement, Appendix A hereto, may be used as a guide. Copies of any agreement developed under this section should be forwarded to the Commandant (G-OSR) and (G-CMA).

1015 Air Transportation Between Medical Facilities

Criteria for the use of Coast Guard aircraft for the emergency transfer of critically ill or injured patients into and between Veterans Administration hospitals has been developed and should be used as a guide for all requests for such transfers between other medical facilities as well. These criteria are:

a. Suitability and availability of aircraft;

b. Non-impairment of the primary missions and training;

c. The emergency is genuine and involves actual lifesaving or reduction of disability;

d. Non-competitive with available and adequate commercial air ambulance service;

e. Need for such emergency movement based on medical decisions;

f. Trained health care personnel to be provided by the requesting medical personnel in accordance with needs and circumstances.

1020 Escort of MEDEVAC Aircraft by Emergency Fire Equipment

Due to the increased time required to evacuate non-ambulatory patients from aircraft in the event of ground emergency, all MEDEVAC aircraft should request escort by emergency fire equipment, when available, during landing and taxi operations.

Section 11. RESCUE BY MARINE CRAFT

1100 Rescue By Ship—General

Rescue methods employed by ships may vary considerably according to their size and the circumstances in which the operation takes place. It is likely that the condition of the survivors will be such that they are unable to help themselves. Specialized SAR ships should be prepared to hoist survivors without expecting any effort on the survivors' part.

1101 Rescue Methods

A number of methods for rescuing survivors by ship's personnel are presented here for guidance. The situations are grouped into three categories: rescue from the water; rescue from a foundering ship; and rescue from a burning ship.

1102 Rescue Ship Preparations

Rescue ship stations that may be manned or augmented during rescue operations are: bridge, lookout positions, boarding station, receiving station, and rescue boat.

a. *Bridge.* If available, a portable loud hailer should be made ready for giving instructions to survivors, boats and ship's personnel at the boarding station and elsewhere on deck. A portable transceiver radio is desirable for direct radio contact with deployed boats.

b. *Lookout Positions.* Extra lookouts should be assigned when circumstances dictate in order to keep rafts or survivors in sight. Special lookouts with rifles may also be posted as a shark watch. These are usually positioned on the flying bridge, but when the ship is rolling excessively it is advantageous to have a second shark watch stationed at the boarding station.

c. *Boarding Station.* It is desirable that the boarding station be located in the forward one-third of the ship, as near the bridge as possible. This will give the conning officer an unobstructed view of the rescue operation and make it easier to maneuver. It will also lessen the possibility of the main induction system ingesting lines or parachutes which may be attached to survivors.

A rescue swimmer and his safety-line tender should always be stationed at the boarding station regardless of which rescue method is being used.

The boarding station should have all equipment necessary to bring the survivors from the sea to the deck. The equipment may include: embarkation nets or rescue-at-sea ladders, Jacobs ladders, portable davit or other hoisting equipment, rescue sling, rescue basket and/or rescue net, portable flood light, line throwing gun, grapnel and line, kapok heaving line, cutting tools such as wire cutters, pruning shears, sharp knives, Stokes Litters, blankets, survivor processing kits, and emergency medical kits.

Where large numbers of survivors are involved, it may be desirable to rig a large rubber life raft alongside the boarding station to act as a platform from which the final step in bringing the survivors aboard can be more easily effected. If the life raft is canopied, the canopy should be cut away for this purpose. Care should be used not to puncture any tubes when cutting away the canopy.

d. *Receiving Station.* A receiving station is a compartment, or other location, to which survivors are taken immediately after rescue. Is is here that they should receive first care. Medical personnel should be assigned, if available to sort the survivors according to their injuries, so that all available medical care can be used effectively.

e. *Rescue boats.* The ship's small boats should be manned and made ready at the onset of any rescue attempt even though their use is not expected. They should be equipped similar to a boarding station as described in 1102c, including a rescue swimmer and safety line-tender. The coxswain should be familiar with boat rescue methods.

When a number of disabled or exhausted survivors needs to be brought aboard, lowering a boat and placing them in it, and then hoisting the boat back aboard may be the best way to do so.

1103 Rescue Swimmers

Properly trained rescue swimmers should be used, in most cases, to recover survivors from the water who need assistance due to fatigue, entanglement or injury. Use of a rescue swimmer will speed recovery of the survivor, prevent further injury and remove the requirement of maneuvering the rescue vessel dangerously close to the survivor. Rescue swimmers must be qualified as such in accordance with Part A, CG-313, and in addition, it is desired that they be qualified as Coast Guard Emergency Medical Technicians (EMTs). Swimmers should be outfitted with a well-fitting neoprene wet suit (in water of less then 80°F), sharp knife, lightweight swimmer's harness, and 600 feet of ¼-inch yellow polylethylene safety line.

The safety line-tender should be equipped with a compact reel for controlling the safety line, such as the scuba "safe reel" type. If a "safe reel" is not available, an acceptable substitute is a telephone lineman's type reel.

The main purpose of the knife is to permit the swimmer to free himself from any entanglement with lowering lines, parachute shroud lines, or other similar hazards.

The safety line should be attached to the swimmer's harness and should be used to pull the rescue swimmer and survivor back to the vessel. The line should be tended at all times, preferably by a person dressed for, and assigned as, a back-up rescue swimmer. If a wet suit is not worn, a type 3 or nonrestricting Personal Flotation Device (PFD) should be used to provide adequate flotation. Bulky type PFDs should not be worn under these circumstances. They will only impede, and possibly prevent, a successful rescue by the swimmer.

The swimmer should have a good knowledge of rescue techniques. In particular he should be competent in the techniques of survivor retrieval, use of the personnel retrieval line (PRL) and Stokes litter immobilization. He should also be competent to perform cardiopulmonary resuscitation in the water. Finally he should be familiar with the various types of survival equipment worn, or used by, maritime and aviation personnel.

1104 Rescuing Survivors From The Water by Ship

a. *Ship alongside/swimmer.* This method should be used for the rescue of either one or a small number of survivors from the water. The ship should approach close to the survivor or survivors and deploy its swimmer or swimmers. Each swimmer should hold onto a survivor, and both survivor and swimmer are hauled back to the ship.

The ship should maneuver just upwind of the survivor on a cross-wind heading. The ship can then drift down to the survivor without having to turn its propellers. This position thus provides a lee for the survivor in the water. A life ring or other flotation device should be thrown to the survivor to provide temporary flotation assistance. The ship should then deploy a rescue swimmer who is lowered to the water by means of the rescue sling and ship's davit. The swimmer then removes the rescue sling and swims to the survivor. Line tenders aboard the ship must supply ample slack in the swimmer's safety line to allow for his easy maneuverability.

Upon reaching the survivor, the swimmer should quickly evaluate his physical and mental condition. The swimmer must maintain positive control of the survivor to prevent him from being pulled down by an attached parachute or through sinking from exhaustion. If the survivor is an aircrewman wearing an oxygen mask, the swimmer must remove the mask to prevent the survivor from suffocating; emergency bail-out oxygen bottles only carry about 15 minutes of oxygen supply.

The swimmer should next free the survivor from any entangling lines or parachute, taking care not to entangle himself. If the survivor is tied to a raft, the swimmer must release it or cut it free.

When the survivor is ready for retrieval, the swimmer should place his arm under the survivor's arm and across to the opposite shoulder. After giving a thumbs-up signal to the rescue ship with the other hand, he should then grab the survivor with both arms. The swimmer should lean back in the water with the survivor to insure that the survivor's head is kept clear of the water. The survivor and the swimmer are then hauled through the water together until they are alongside the ship. If it is necessary to stop the hauling-in procedure, (in order, for example, to give mouth-to-mouth resuscitation to the survivor), the swimmer should raise one arm with fingers extended in a stop signal. When ready to recommence being hauled, the swimmer should give another thumbs-up sign.

The swimmer should release his hold on the survivor when he is alongside the ship, and he should ensure that the survivor is correctly positioned in the rescue sling, rescue basket or litter.

Whenever a survivor has injuries, a Stokes litter should be used to bring him aboard. Prior to placing the litter in the water, all straps should be opened and positioned outboard. The litter should be rotated so as to position the chest pad outboard from the rescue vessel's side. The foot of the litter should be allowed to sink slightly. The rescue swimmer should slide the survivor into the litter from the foot end. The survivor should be positioned in the litter so as to allow the top strap to cross the survivor's chest with the arms remaining outside of the strap. The remaining three body straps are then snugly secured in position. The survivor's arms should be positioned inside the litter and secured under the chest pad strap. After the survivor is secured in the litter, he is hoisted aboard the ship. The swimmer is hoisted last.

When rescue of more than one survivor is necessary by this method, a swimmer for each should be dispatched, if practical. In such a case, the boarding station should be adequately manned and a boarding platform, consisting of a rubber boat/raft without canopy, should be rigged. Two crewmen, preferably rescue swimmers, should be assigned to man the station and assist survivors aboard as they are hauled to the ship.

1105 Rescuing Survivors From A Distressed Ship Which Is Foundering

a. *Ship to ship/direct.* This method requires the rescue ship to come close alongside and contact the distressed ship. Survivors then jump, climb or swing aboard directly from the deck of the distressed ship to the deck of the rescue ship. This method can usually only be used when the sea conditions are relatively calm. Consideration has to be given to the strength and condition of the distressed ship's hull, in case hard impact between ships occurs. When conditions are favorable, the rescue ship takes position to one side of the wind line that is blowing over the distressed ship, and maneuvers to the same heading as the distressed ship. The rescue ship then stops engines and carefully observes the relative drift between the two ships. This is necessary in order to determine the best approach.

Usually the most favorable approach can be made on either the lee bow or the lee quarter of the distressed ship. There are several advantages to using this approach. It usually provides the survivors with the easiest possible means of getting from the deck of their ship to the deck of the rescue ship since relative deck heights are usually less at these positions. There is normally less debris, line, cables, booms, etc., hanging over the side of these areas. These can be especially hazardous to a rescue ship when making its approach and must be looked for in all rescue attempts. Debris and cables can easily foul a ship's propellers, while booms and other rigging that have broken loose from the distressed ship's deck can cause serious damage to the rescue ship should they strike it. Because of the angle of the approach on the lee bow or quarter, the rescue ship's stern is usually clear for maneuvering and backing down. A different approach is used if the distressed ship is burning. This is discussed in section 1106.

After the approach has been determined, the rescue ship proceeds to ease its bow up against the hull of the distressed ship, and holds it there with necessary throttle until all survivors have been transferred. The rescue ship should place mattresses on the deck at the location where the survivors are coming aboard. This helps to minimize injuries that might otherwise result due to jumping aboard.

This method should not be attempted if doubt exists as to the safety of the rescue ship or her crew. If doubt does exist, consider other methods.

b. *Ship to ship/raft haul.* The use of rubber rafts or rubber boats for the removal of survivors from a foundering ship can be the safest and most effective method when heavy weather is present. Rubber rafts have been used many times to successfully remove entire crews from distressed ships. The greatest advantage in using rubber rafts or rubber boats is that they can be safely used close alongside a ship in heavy seas without damaging them or the ship, or injuring the occupants. The raft haul method requires two seven-man, or larger, rubber rafts (Zodiac or Avon rubber boats may be substituted when available), two suitable lengths of three inch nylon line, and a line throwing gun. When preparations are complete, the rescue ship makes its approach. The approach must be made in such a manner that a safe interval between ships can be maintained while the rescue operation is in progress. When the rescue ship reaches a suitable position, and is able to maintain it, a messenger line is passed to the distressed ship by means of the line throwing gun. Both of the three inch nylon hauling lines are secured to one raft. The other end of one hauling line is made fast to the messenger line previously passed to the distressed ship. This line is then pulled over to the distressed ship by her crew. The second hauling line attached to the raft is tended by the crew of the rescue ships. The raft can now be hauled back and forth between ships until all the survivors have been transferred. *Raft canopies must not be rigged for this operation.* If necessary, the canopy should be cut away, leaving the canopy support members unharmed. The reason for these precautions is that survivors must be able to enter and leave the raft with ease.

The second raft, also without canopy, is used as a boarding platform. It should be rigged and moored alongside the rescue ship boarding station outboard of the embarkation net or ladder.

On each return trip the transfer raft is hauled up alongside the boarding platform where the survivors can be readily assisted aboard. The transfer raft is hauled back to the distressed vessel for the next load of survivors.

This method can also be used effectively for transferring dewatering pumps, or other essential supplies when conditions are too severe to attempt a ship-to-ship method or a launching of the rescue ship's small boats.

c. *Ship-to-ship/raft drift.* If the weather and sea conditions will not permit maintaining a stable and constant separation between vessels, the use of a free drifting raft, without canopy, may be in order. This method is feasible only if the raft drifts at a greater rate than the distressed ship; with some newer ballasted rafts this may not be the case. If uncertainty exists on this point, a test of relative drifts can be made. If the distressed ship drifts significantly faster than the raft, it may be possible to reverse the procedure and allow the distressed ship to drift down on the raft.

When the raft is drifted downwind to the distressed ship, it will be against the windward side. The crew of the distressed ship should then be instructed to snag a buoyant trail line attached to the raft with a boat hook or grapnel. The raft can then be hauled around to the lee side of the distressed ship where the survivors can abandon ship more safely. Once the survivors are all aboard the raft, the trail line is released and the raft is maneuvered clear of the distressed ship's lee side. When it is a safe distance from the distressed ship, the rescue ship can maneuver to a position just upwind with engines stopped. When the raft is safely in the lee of the rescue ship it can be brought alongside after throwing kapok heaving lines to the occupants. Once alongside,

personnel are assisted aboard at the boarding station. *If the possibility exists that the survivors on the distressed ship will have difficulty in initially recovering the drifting raft, a line throwing gun should be used to place a raft recovery line in the hands of the distressed crew.*

A variation of this method is to use one hauling line attached to the raft and tended by the rescue ship's crew. The hauling line is kept slack while the raft drifts to the distressed ship and until the raft drifts clear of the ship after boarding by the survivors. The line is then used to haul the raft to the rescue ship.

Another variation of placing a raft alongside a distressed ship is to tow it astern of the rescue ship, and place it alongside the distressed ship and then stop in such a manner that the raft drifts to the side of the distressed ship. When the raft gets alongside, the rescue ship's crew lets go of the tow line and it is picked up by the distressed ship's crew with a grapnel or boat hook.

d. *Ship to ship/small boat.* The rescue ship's small boats can be very effective for removing survivors from the distressed ship. The usual limiting factors are weather and sea conditions. However, the sea-keeping qualities of most rescue boats and lifeboats are generally sufficient to enable them to withstand just about any type of sea conditions, provided that they are handled properly. The hazards involved in launching and retrieving small boats in heavy weather is usually what prevents their use. Launching boats in heavy weather can result in a boat being smashed against the hull of a rolling ship. Retrieval of a small boat is even more hazardous to the boat and its occupants.

The boat's maneuverability should be compared to motions of the distressed ship and given careful consideration. The inability to maneuver quickly could result in the boat becoming pinned against the hull of the distressed ship and ultimately smashed apart or lifted by the sea to the deck of the ship. See section 1113 on rescuing survivors from ships by boat.

After the removal of survivors from the distressed ship, the loaded boat should proceed to the lee side of the rescue ship and survivors should be brought aboard at the boarding station or hoisted aboard with the boat. If rafts are used during the rescue, and transferring survivors from the raft to the boat is considered too hazardous, the raft should be towed astern of the boat and moored alongside the boarding station on the lee side of the rescue ship. Removal of survivors to the ship can then be accomplished.

1106 Rescuing Survivors From A Burning Ship

When rescuing survivors from a burning ship, remember that the urgency of the situation is compounded not only by the fire but also by the possibility of explosion. The survivors have to be removed as quickly as safety permits. Normally, the approach to a burning ship is from upwind. This will keep the rescue ship clear of smoke, flame or sparks that could seriously hamper the rescue attempts.

Before approaching, the rescue ship should break out all fire fighting equipment, including extinguishers, fire hoses, portable fire pumps, etc. The pumps should be operating, all hoses should be led forward and pressure should be placed on them.

Surface craft which are not equipped with portable fire pumps or built-in fire fighting systems should not attempt to approach a burning vessel too closely. They should approach as close as is safe and then direct the people on board to put on life jackets and jump overboard on the windward side of the burning ship. The burning ship will drift downward away from the survivors in the water and the rescue ship will then be able to rescue them from the water.

When the rescue ship is equipped with portable fire pumps and/or built-in fire fighting systems, it may be possible to remove the survivors by placing the bow of the rescue ship against the hull of the burning ship. Before this is attempted the rescue ship must string extra fenders and whatever other extra padding is available (e.g., life jackets, cushions, mattresses, etc.) on a line and hang these over the bow to serve as a bow fender. The bow

of the rescue ship will be the contact point with the side of the ship on fire.

The approach should be made on the upwind side. Fire hoses should be directed in such a way as to suppress the flames and cool deck areas that survivors must transit. High pressure steady stream water should not be directed against vertical surfaces of the burning ship. This could cause the ship to drift away from the rescue ship. It might also cause a weakened hull to break up or cause injury to the survivors. The primary concern is the safe removal of the survivors—not extinguishing the fire. Contact with the burning ship's hull should be in the vicinity of the bow or stern and head-on. The rescue ship's bow should be eased up to the selected point of contact; after that a slight increase in throttle will be all that is required to hold the ship's together until the survivors are rescued.

Care should be taken during the approach to keep the wind dead astern. Should the rescue ship angle off the wind, the wind could cause the rescue ship to come broadside to the burning ship when contact is made. This should be avoided at all cost; otherwise the rescue ship may have great difficulty in getting away from the burning ship. Always allow for a quick retreat.

With the ships together, the removal of survivors should be accomplished with all possible speed. Then, the rescue ship should back away and leave upwind from the burning ship.

After survivors have been safely rescued, and if their condition permits a delay in transporting them to a safe delivery point, an attempt to extinguish the fire may be made.

1110 Rescue By Boat—General

When survivors are located in lakes, sheltered waters, rivers, or coastal areas, rescue will often be made by fast boats of limited range based close to the distress scene. When survivors are in deep water, large ships may launch their small boats to complete a rescue. Since boats are generally small in size and may not be able to take all survivors on board at one time, a sufficient number of them should be dispatched to the distress scene. If this is not possible, each boat should carry rafts so that those survivors which cannot be taken aboard immediately can either be towed to safety in the rafts, or kept afloat in them while they await their turn or the arrival of another boat. If survivors must be left behind, rescue boat crews should insure that they are made as secure as circumstances permit.

1111 Rescue Boat Preparation

In general, rescue boats are much more limited in rescue equipment than rescue ships. However, since a rescue boat is essentially a floating boarding station, its equipment should parallel that of a rescue ship's boarding station. If the boat is a multi-purpose boat, a special rescue kit can be made up for placement on the boat during rescue missions.

Equipment may include portable radio transceivers, grapnels and line, survivor lifting line with rescue sling, cutting tools, tools for extracting survivors from wreckage, blankets, survivor processing kit, and a first aid or emergency medical kit. In situations where large numbers of survivors may be expected, inflatable rafts or inflatable rescue platforms should be carried to provide emergency flotation for those who cannot be taken aboard the boat.

Of special importance are Personnel Retrieval Lines (PRLs). The lines may be made up of any size, although a 2½" – 3½" circumference line ispreferred. A rescue sling, bowline, or loop is tied or spliced into one end of the line. PRLs may be made up in advance or improvised from the boat's mooring lines at the time of rescue. If made up in advance, the loop or sling should be adequately padded to prevent rope burn or binding of the survivor while he is being lifted/assisted aboard. PRLs should be used in both swimmer assisted and direct rescue of persons from thewater. The PRL makes the rescue a quicker, easier and safer operation. The PRL will assist exhausted survivors in climbing the net or ladder of larger boats, or over the gunwale of small boats. It will prevent the survivor from falling backwards intothe water while boarding the boat and will help prevent loss of the survivor at the last moment before rescue.

1112 Rescuing Survivors From The Water by Boat

a. *Boat/Swimmer.* A rescue swimmer should be used when it is too dangerous or too difficult to put the boat alongside the survivor.

The coxswain should use the same approach and swimmer recovery techniques described in section 1104a for rescue ships, with one major difference. The approach should be made so that the boat and survivor will drift apart when the boat is stopped. In most cases the relative drift can be determined by stopping the boat to one side of the wind line passing over the survivor and the boat. Whenever time permits, this observation should be made. In most cases, even after careful consideration of relative drift and underway speed, the boat should only approach as close as is necessary to allow a swimmer to make the recovery. He should be deployed when the boat is 20–30 feet away. He should follow the same procedures for swimmer-assisted rescue described in section 1104a, with the following exceptions: (1) The safety line should be 100–150 feet of ¼-inch polyethylene line. For quick deployment it should be coiled and attached to the back of the swimmer's harness; (2) The use of a Stokes litter for injured survivors requires a crewman aboard the boat to position and stabilize the litter utilizing the four tending lines. Once the survivor has been properly strapped in the litter, the two lines attached at the foot of the litter should be dropped and the litter lifted vertically with the survivor facing outboard. With a crewman on each side of the litter it is then lifted high enough to be pivoted over the gunwale. One crewman then pulls the head of the litter inboard and the other crewman handles the foot end of the litter. To accomplish the vertical lift of the litter, the crewmen must coordinate their efforts. More lifting force can be applied to the litter if one foot is placed on the gunwale and the free hand used to grasp any available hand hold; (3) A personnel retrieval line (PRL) should be used to lift uninjured survivors who are helpless or unconscious. The PRL is made up as described in section 1111. The loop should be placed under the arms and across the chest by the swimmer. The survivor is then hoisted aboard with his back to the boat. The swimmer assists from the water, unless his assistance is needed on the boat. Two crewmen, one on each side, should grasp the loop and lift the survivor into a sitting position on the gunwale. The survivor should then be moved inboard by lifting his legs and supporting his back. **Caution:** do not **drag** the survivor over the edge of the gunwale.

b. *Boat/direct.* **Caution:** Before using this recovery method, ensure that the survivor is both uninjured and able to assist himself in climbing aboard.

With the engine clutch in neutral and propellers stopped, the boat should drift toward the survivor. The survivor should be positioned alongside the lowest freeboard section of the boat. When the survivor is alongside, the PRL is passed to him and positioned under his arms and across his chest. He is then lifted aboard. If a PRL is not available, the arms and clothing of the survivor should be used by the boat crewmen to pull him aboard. In this one instance, the survivor should face the boat so that he can assist in pulling himself aboard. On low freeboard boats and on rafts, the survivor may be lifted horizontally by grabbing his trousers and legs in addition to his arms and shirt. This will permit more crewmen to assist in lifting.

1113 Rescuing Survivors From Ships

a. *Ship-to-boat/direct.* This method can be used when sea conditions permit. The approach to the distressed ship should be made on its lee bow or lee quarter unless the ship is on fire. (In that case, procedures similar to those in section 1106 should be used.) The leeward side will provide smoother water and safer removal of the survivors. By making the approach angled to the bow or quarter, the rescue boat is provided with open water astern for maneuvering and backing down. The boat should approach the distressed ship only as close as it is safe to do so.

In some cases it may be possible for the distressed ship to rig a life raft alongside as a debarkation station. If it does, the canopy should be removed or cut away. In this instance the boat can come alongside the raft instead of alongside the ship.

Once alongside, the survivors can move toward the boat (or raft if used) by sliding down lines, by climbing down nets or by jumping into the water first. They should never be told to jump into the boat or raft from heights above 5 feet: they might injure themselves or might continue right through the bottom of a raft. When all survivors are aboard, or the boat is filled to capacity, the boat should back off until clear of the ship.

b. *Ship-to-boat/raft.* When a close approach by boat is too hazardous, the boat can then approach to a safe distance and float the raft, with a line attached, down to the distressed vessel. The raft canopy should not be rigged. When using this method a rescue swimmer and his line tender should be placed in the raft to aid in guiding it alongside the ship. The swimmer and his line tender assist the survivors as necessary. When all survivors have been embarked, or the raft be towed to safety away from the distressed ship's side and the survivors transferred to the boat.

1114 Rescuing Survivors From Aircraft

If an aircraft remains afloat, there may be a possibility of towing it to a safe anchorage or into shallow water. However, the condition of the survivors is the prime concern and they should be removed to safety immediately. This holds true even though injuries are not apparent; there is always danger of shock. If there is a chance of saving the aircraft, additional units should be assigned to this task.

a. *Rescue from floating seaplanes or amphibians.* The following rules should be followed for boat approaches to a floating seaplane or amphibian:

(1) Before an approach is attempted, the boat operator should take a position in front of the aircraft and on the same heading. The boat should be stopped and a comparison should be made of the rates of drift. Normally the plane will drift faster than the boat and will take up a position heading into the wind.

(2) The approach to the aircraft should be made from such a direction that the difference in rate of drift will tend to separate the aircraft and the boat.

(3) In approaching an aircraft during any weather except the smoothest, the boat should *never go under the wing or tail.* If the motion of the aircraft is lively, damage to the aircraft and injury to the boat's crew would be likely to occur from such a maneuver.

(4) When it is necessary to go alongside the aircraft, plenty of fenders should be made ready for use. As a firm contact is likely to occur, the boat crew should help to cushion the contact by fending off by hand. A preferred method is to have the plane crew rig a rubber raft alongside, the boat going alongside the raft and survivors boarding the boat via the raft. The raft canopy should not be rigged.

(5) When conditions are too rough for a boat to go alongside the aircraft, the boat may stand off and personnel can be transferred by shuttle using a rubber liferaft and line. Again, the raft canopy should not be rigged. A swimmer and tender should be placed in the raft to assist the survivors aboard as well as to insure proper handling of those who may be injured.

d. *Rescue from ditched aircraft.* In cases of ditching, it is extremely important that assistance arrive quickly to remove any injured persons from the plane, rafts, or water. The aircraft flotation is unknown and it must be assumed that it will be of short duration. Much will depend on the damage the aircraft sustained in the ditching. Boat crews involved in rescues from ditched aircraft should be aware of the following:

(1) Those survivors in rafts are in the safest position. Therefore, survivors in the water, survivors clinging to debris and survivors still aboard the aircraft should be rescued first.

(2) An aircraft that has ditched will usually be in a nose down position. The aircraft should be approached as expeditiously as possible in order to remove any personnel trapped inside. It may be necessary to break into the aircraft to release trapped personnel. Some aircraft have panels marked for emergency access which can be easily ripped out. Entry should never be attempted through emergency exits which are under water.

(3) Precautions must be observed to avoid igniting fuel spilled in connection with the ditched aircraft. Boats with internal com-

bustion engines may reduce this hazard by approaching from the weather side to the edge of the fuel spillage and using a rubber liferaft shuttle or a swimmer to rescue survivors.

(4) In the event there is a fire, caution in approaching the plane must be exercised. The approach should normally be made by coming in on the weather side as close as is safe.

(5) First aid should be given to injured survivors. Rescue crews should include an Emergency Medical Technician (EMT) and they should carry emergency medical supplies. Because it is difficult to render definitive emergency care on a rescue boat, it may be necessary to set up a temporary station at a convenient point on shore when medical facilities are not close at hand.

1115 Coordinated Helicopter/Boat Rescue

See paragraph 977 of the basic manual which covers this situation.

LIST OF EFFECTIVE PAGES

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DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
Commandant (G-OSR-4)
U. S. Coast Guard
Washington, D.C. 20593

COMDTNOTE 16130
13 AUG 1980
Cancelled: 31 DEC 1980

COMMANDANT NOTICE 16130

Subj: CH-13 to USCG Addendum to National SAR Manual (COMDTINST 16130.2)

1. PURPOSE. This notice provides a change to subject addendum.

2. DISCUSSION. This change revises Section 2 of subject manual. The major revision is the inclusion of coastal search planning as now being taught at the National SAR school. It also introduces a new numbering method for the figures, using the section number and a sequential number. Figures in other sections will remain numbered as is for the present but will be changed to the new method in upcoming future changes.

3. ACTION.

a. Remove pages from the Addendum (salmon colored pages) and replace with the enclosed replacement pages as shown below:

Remove pages	Insert Change No. 13 Pages
vii thru ix	vii thru ix (Reverse Blank)
2-1 thru 2-6	2-1 thru 2-14
LEP-1	LEP-1 (Reverse Blank)

b. Make the following pen and ink corrections:

(1) Page 6-1 - In upper right hand corner put "0600-0610";
(2) Page 6-2 - In upper left hand corner put "0610--0625";
(3) Page 6-3 - In upper right hand corner put "0625--0635";
(4) Page 6-4 - In upper left hand corner put "0635--0640";
(5) Page 7-1 - In upper right hand corner put "0700--0710".

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B		4	25	1	79		75	2		*	3	26		125	2		1			3						
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COMDTNOTE 16130
18 AUG 1980

c. Check the list of the effective pages.

d. Make an entry in the record of changes.

JOHN D. COSTELLO
Chief, Office of Operations

Encl: (1) CH-13 to USCG Addendum to National SAR Manual (COMDTINST M16130.2)

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Section 2. COASTAL SEARCH PLANNING AND SEARCH PATTERNS FOR SMALL UNITS

0200 General

The search planning method addressed in the National Search and Rescue Manual (COMDTINST M16130.2, old CG-308) was designed for use in oceanic areas beyond 25 miles of the coast. Most SAR cases, however, occur within 25 miles of the coast and are controlled at the Group/Station level.

This section provides Group/Station personnel with a guide for planning an initial search effort for use within their area of SAR responsibility. It contains simplified procedures for determining the following:

(1) Datum

(2) Search Area

(3) Search Pattern

If the search object is not found by the initial search effort, further search planning should be coordinated with the Rescue Coordination Center.

0205 Datum

The first step in search planning is to determine datum (most probable position) of the search object for the time when the search craft arrives on scene. Datum is found by considering the effects of total water current, and wind effect on the search object which is more commonly referred to as leeway. The combined effect of total water current and leeway cause the drift from the search object's last known position to datum. By solving for the direction and distance of drift, considering the time elapsed between the time of the distress and arrival of the search craft on scene, datum can be determined prior to arrival. The total water current can be determined by direct observation, or it can be estimated by the use of current charts or tables, or by the application of local knowledge. Leeway can be derived from appropriate tables or graphs.

0210 Types of Water Current

The five types of water currents most commonly found in coastal regions are:

(1) *Tidal currents* are caused by the rise and fall of the tides and they can change direction and velocity as the state of the tide changes. Local knowledge is of great value in dealing with the movements of tidal currents.

(2) *River currents* will affect both tidal and sea current on the discharge side of the river mouth. These currents are caused by the movement of the water from the flow of the river into the ocean.

(3) *Coastal currents* are the movement of water parallel to the coastline outside of the surf zone, usually caused by ocean currents striking land masses or shallow water areas. These currents are frequently in the opposite direction from the ocean current.

(4) *Longshore currents* are only considered in coastal areas within 1 mile of the shoreline. Longshore currents are generated by the incoming swells striking the beach at an angle. The direction of the resulting current is usually parallel to the shoreline.

(5) *Sea current* is the current present in the open ocean that is caused by factors other than local winds. Generally the boundary between sea current and other inshore currents is approximately near the 300-foot depth of water mark.

0215 Sources of Water Current Information

Each group and station should search for current data for their SAR area. The following list provides possible sources of this information:

(1) Surface Current Atlases.

(2) Tidal Current Tables.

(3) Tidal Current Charts.

(4) Sea Current Charts.

(5) Sailing Directions.

(6) Coast Pilots.

(7) Corps of Engineers offices.

(8) National Ocean Survey offices.

(9) Naval Fleet Weather Centers.

(10) Farmer's Almanac/Seaman's Almanac.

(11) Datum Marker Buoys (DMB).

(12) Expendable Surface Current Probes (ESCP).

(13) Local Sources.
- (a) Marinas.
- (b) Harbormasters.
- (c) Sailing and yacht clubs.
- (d) Pilot stations.
- (e) Marine supplies.
- (f) State fish and game/park Services.
- (g) Sheriff and marine police.
- (h) Fishery associations and fishermen.
- (i) Marine operations and salvage companies.
- (j) Oil companies.

0220 Coastal Search Planning Worksheet

The Coastal Search Planning Worksheet (Figure 2-1) is provided for assistance in completing datum and search area computations.

COASTAL SEARCH PLANNING WORKSHEET

A. DATUM

1. To be determined for what time? _____ Z/L
2. Last Known Position or Previous Datum
   a. Time _____ Z/L
   b. Position in Latitude and Longitude _____ N _____ W
3. Time Interval _____ HRS
4. Total Water Current (TWC) Data Source _____
   a. Direction and Speed _____ ° _____ KTS
   b. Total Water Current (TWC) Vector _____ ° _____ NM
5. Leeway (LW) downwind
   a. Surface Wind _____ ° _____ KTS
   b. Direction (surface wind reciprocal) and Speed (Leeway Speed Graph) _____ ° _____ KTS
   c. Leeway (LW) Vector _____ ° _____ NM
6. Total Drift (D) Vector _____ ° _____ NM
7. Datum _____ N _____ W

B. SEARCH AREA

1. Search Radius (R) and Search Area (A) _____ NM _____ SQ NM
2. Search Area Corner Points
   a. _____ N _____ W c. _____ N _____ W
   b. _____ N _____ W d. _____ N _____ W
3. Search Pattern _____

FIGURE 2-1

0225 Determination of the Drift Time Interval

1. The first step in computing the drift time interval is to record the time of the desired datum. (Figure 2-1, Item A.1).

2. The next step is to record the time and latitude and longitude of the search object's last known position. (Figure 2-1, Items A.2.a and A.2.b.).

3. The drift time interval is equal to datum time minus the last known position time. Record the result to the nearest tenth of an hour in the space provided. (Figure 2-1, Item A.3).

0230 Determination of the Total Water Current Vector

1. Obtain the water current in the area of the last known position. Record its source, direction and speed on the worksheet. (Figure 2-1, Items A.4 and A.4.a.).

2. Carry forward the water current direction to the Total Water Current Vector. (Figure 2-1, Item A.4.b.).

3. Multiply the water current speed by the drift time interval. Record the distance to the nearest tenth of a mile on the worksheet. (Figure 2-1, Item A.4.b.).

0235 Determination of the Leeway Vector

1. Record the surface wind in the vicinity of the search object's last known position on the worksheet. (Figure 2-1, Item A.5.a.).

2. For planning purposes the direction of leeway will be assumed to be down wind. Add or subtract 180° to the surface wind direction and record the result on the worksheet. (Figure 2-1, Item A.5.b.).

3. Enter the leeway speed graph (Figure 8-6 of the National Search and Rescue Manual) with the surface wind speed and the search object type. Read the leeway speed from the appropriate curve and record the leeway speed to the nearest hundredth of a knot on the worksheet. (Figure 2-1, Item A.5.b.).

4. Carry forward the leeway direction to the Leeway Vector. (Figure 2-1, Item A.5.c.).

5. Multiply the leeway speed by the drift time interval. Record the distance to the nearest tenth of a mile on the worksheet. (Figure 2-1, Item A.5.c.).

0240 Determination of the Total Drift Vector and Datum

Now that the total water current vector and leeway vector have been determined, the total drift effect can be determined. This is accomplished by vectorially adding the two vectors, starting at the last known position. The resultant represents the most probable path of the search object taking into account the effects of drift. This resultant is called the Total Drift Vector. Determine the direction of drift and measure the total drift distance. Record these values on the worksheet. (Figure 2-1, Item A.6). The position at the end of the Total Drift Vector is datum. Record this position on the worksheet. (Figure 2-1, Item A.7).

0245 Search Area

In most cases, if the SRU proceeds to datum, the vessel will be located. However, in some cases, the search object may not be in sight. This will be caused by inaccuracies in the initial reported position, the inherent errors associated with the drift factors used in determining datum and errors in the navigation of the SRU. Therefore, an area which should be systematically searched must be developed. To determine the size of the area, guidelines are provided for the following four scenarios:

(1) Vessel Adrift. If the distressed vessel gives its position and does not indicate that it is at anchor, assume that it is adrift. Compute its datum. If the vessel is not located at datum, draw a 6 mile radius centered on datum. Then draw a square search area so that the sides are tangent to the circle (Figure 2-2). The resultant search will be 144 square miles. If the distressed craft reports a position which is located in shallow water, there always exists the possibility that the vessel may attempt to anchor. Therefore, particular attention should be paid to the situation when the reported position is located outside the

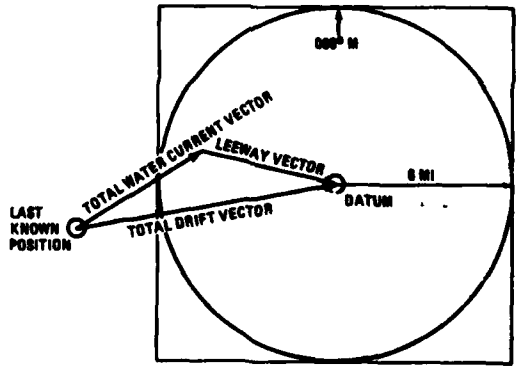


FIGURE 2-2 Vessel Adrift.

search area. In many cases, it may be possible to search along the drift line from the reported position to datum during the initial stage of the search. However, it may be necessary to search the drift line after the search of the area has been completed.

(2) Time Uncertainty: If the time of the incident is uncertain, calculate a datum for the shortest possible time the vessel could be adrift, and calculate a second datum for the longest possible time the vessel could be adrift. Draw a 6 mile radius around each datum, and then enclose the two circles in a rectangle (Figure 2-3). To determine the size of the area, multiply the length in miles by the width in miles.

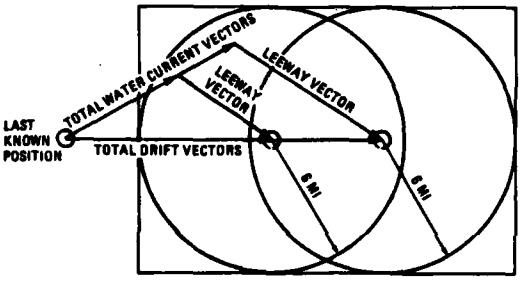


FIGURE 2-3 Time Uncertainty.

(3) Position Uncertainty: If the position of the distressed craft is in question, calculate a datum for each position. Draw a 6 mile radius around each datum, and then enclose the circles (Figure 2-4). If the initial reported positions are separated by extreme distances, it may be better to treat each position as a vessel adrift scenario.

(4) Trackline Overdue Incident: If a vessel is overdue along a trackline, determine a datum near the beginning of the track, another near the end of the track, and one at each turnpoint. Draw a line connecting all datum points. This line is called a datum line. Draw a 6 mile radius around each datum and enclose them in rectangles by drawing tangents to the circles (Figure 2-5).

0250 Track Spacing

Track Spacing (S) is the distance between adjacent search legs. The desired track spacing

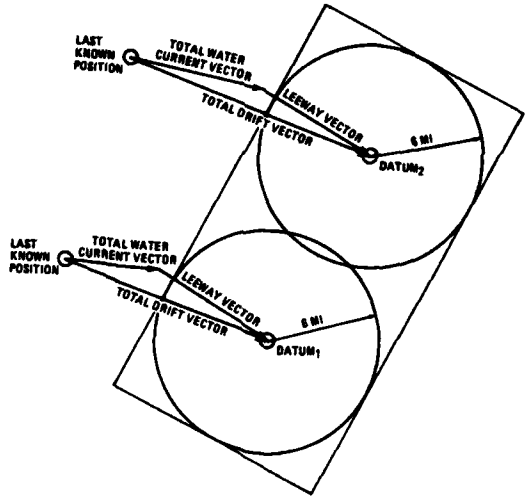


FIGURE 2-4 Position Uncertainty.

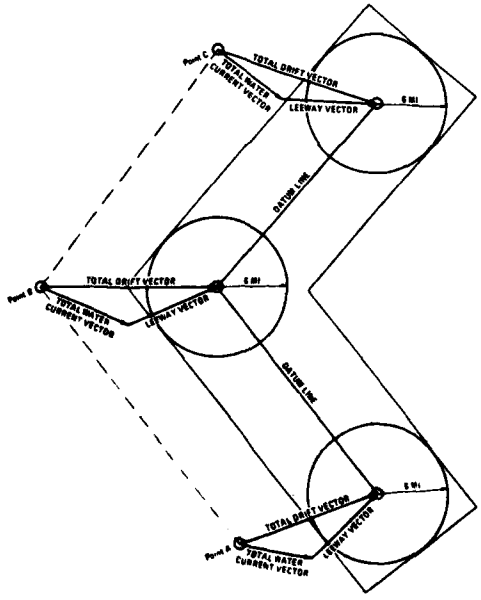


FIGURE 2-5 Trackline Overdue.

is a function of detection capability. The more difficult the target is to detect, the closer the search legs should be. For the coastal search problem, the following recommended standard track spacings are based on search objects less than 30 feet. (NOTE: Search objects greater

than 30 feet will have a greater probability of detection at these track spacings)

(1) Good Search Conditions

(a) Winds—Less than 15 knots, *and*

(b) Visibility—Greater than 3 miles.

Use a track spacing of 3 miles day or night (after dark for lights).

(2) Poor Search Conditions

(a) Winds—Greater than 15 knots, *or*

(b) Visibility—Less than 3 miles, but greater than 1 mile.

Use a track spacing of 1 mile day or night (after dark for lights).

(3) Man in the Water

(a) When searching for a man in the water, it is assumed that the man is not wearing any floatation device, therefore, he will be very difficult to detect. For good search conditions use a track spacing of ¼ mile. For poor search conditions, reduce the track spacing as appropriate taking into account the visibility, and the navigational and operational capabilities of the search unit.

0255 Decision Making

When conditions will not allow the area to be searched with the recommended track spacing, then a compromise must be made. The Time Versus Area Tables, for both good and poor search conditions, and the Decision Aids Graphs will assist in the decision making process. The Time Versus Area Tables (Figures 2-6 and 2-7) show the relationship between time, square miles of search area and radius.

TIME VERSUS AREA TABLE

Good Search Conditions: (Visibility better than 3 NM and winds less than 15 kts).

Search Unit Speed: 12 knots.

Track spacing: 3 NM.

Parameters of Search Area at Above Conditions

Time Required	*Square Miles*	*Radius*
6.7 mins	4	1
26.7 mins	16	2
1.0 hrs	36	3
1.8	64	4
2.7	100	5
4.0	144	6
5.4	196	7
7.1	256	8
9.0	324	9
11.1	400	10
13.4	484	11
16.0	576	12
18.8	676	13
21.8	784	14
25.0	900	15
28.4	1024	16
32.1	1156	17
36.0	1296	18

NOTE.—To convert tenths (0.1) of an hour to minutes multiply the tenths by 60 (0.1 hr = 6 minutes).

FIGURE 2-6.

TIME VERSUS AREA TABLE

Poor Search Conditions: (Visibility less than 3 NM or winds greater than 15 kts).

Search Unit Speed: 9 knots.

Track spacing Used: 1 NM.

Parameters of Search Area at Above Conditions

Time Required	*Square Miles*	*Radius*
26.7 mins	4	1
1.7 hrs	16	2
4.0	36	3
7.1	64	4
11.1	100	5
16.0	144	6
21.7	196	7
28.4	256	8
36.0	324	9
44.4	400	10
53.8	484	11
64.0	576	12

NOTE.—To convert tenths (0.1) of an hour to minutes multiply the tenths by 60 (0.1 hr = 6 minutes).

FIGURE 2-7.

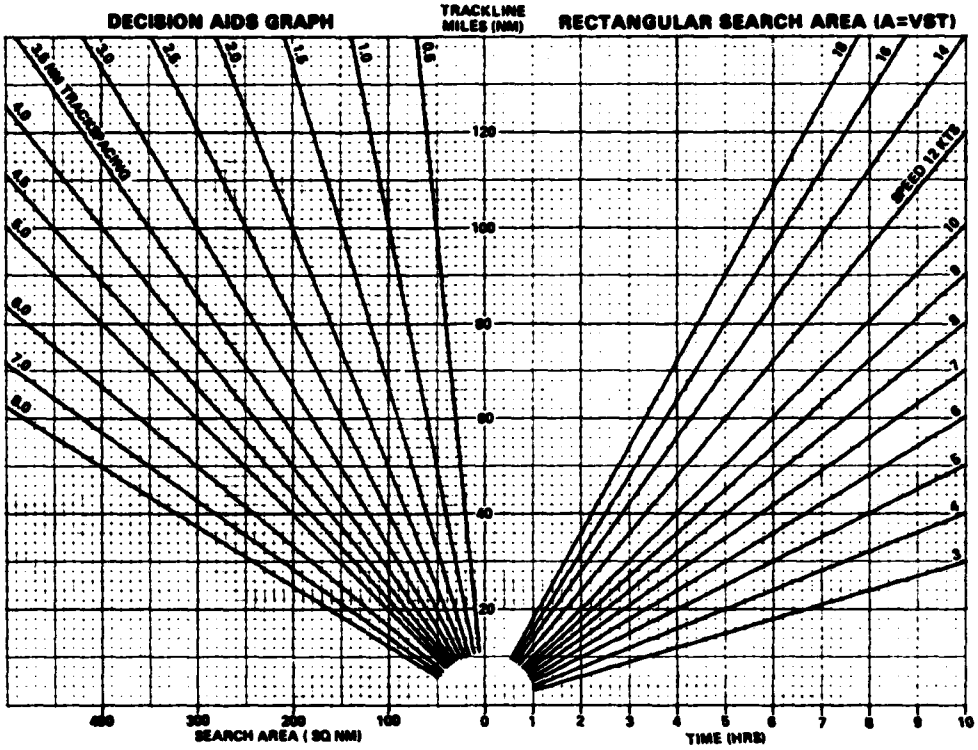


FIGURE 2-8
Rectangular Search Area Decision Aids Graph

The Rectangular Search Area Decision Aids Graph (Figure 2-8) indicates the relationship between track spacing, search area, search speed and time. When any three factors are known the fourth factor can be determined. The effects of altering any one of the factors can also be readily seen.

The Sector Search Decision Aids Graph (Figure 2-9) shows the relationship between search radius, search area, trackline miles, search speed and time. Like the Rectangular Search Area Decision Aids Graph, when any four factors are known, the fifth factor can be easily determined.

A general rule of thumb is to search an area thoroughly especially near the datum or datum line rather than search a large area with a low probability of success. In other words, it is recommended that the search units use the standard track spacings and compromise on the size of the area, if necessary.

0260 Small Boat Search Patterns

The Search patterns in the National SAR Manual can be used by any unit. However, for boats and small vessels, some patterns may prove to be too sophisticated. For this reason, the following simplified search patterns have been developed for use by smaller surface craft. A copy of these pages should be carried in each small boat of the Coast Guard for ready reference.

1. Square Single Unit—Sierra Sierra (SS) (Expanding Square) This pattern is used when datum or the last known position is established within close limits with a high degree of confidence. For boats, the first leg should normally be in the direction of the search object's drift. If this is not practical, then another direction for the first leg can be used. However, no matter what direction is selected for the first leg, all course changes are 90° to the right.

The pattern shown in Figure 2-10 has a track spacing of 1 mile. The length of each leg is indicated. If you desire to use any other track spacing, the length of each search leg can easily be determined by multiplying the distances shown in the pattern by the track spacing desired. For example, if you desire to use a 3 mile track spacing, the first two search legs would be 3 miles, the second two legs would be 6 miles, etc.

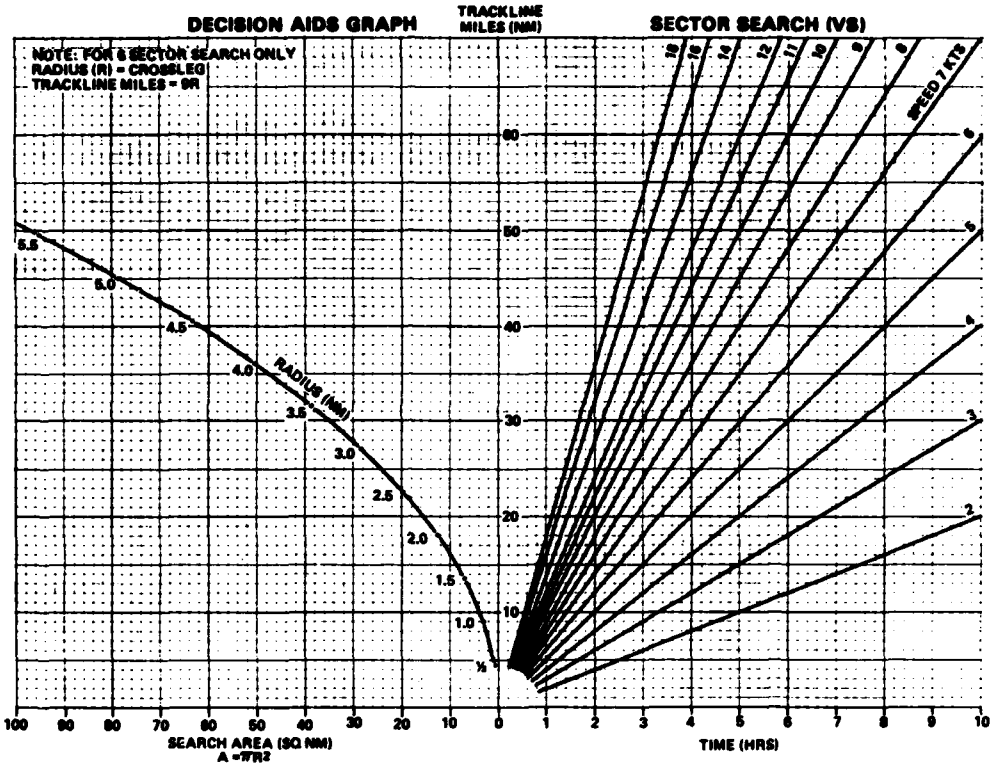


FIGURE 2-9
Sector Search Decision Aids Graph

To determine the time to complete any individual search leg, use the Square Pattern Computation Table (Figure 2-11). Enter the table with the track spacing and search craft speed. Multiply the number obtained from the table by the length of the search leg shown in Figure 2-10. The resultant will be the time required to complete that search leg at the indicated search speed.

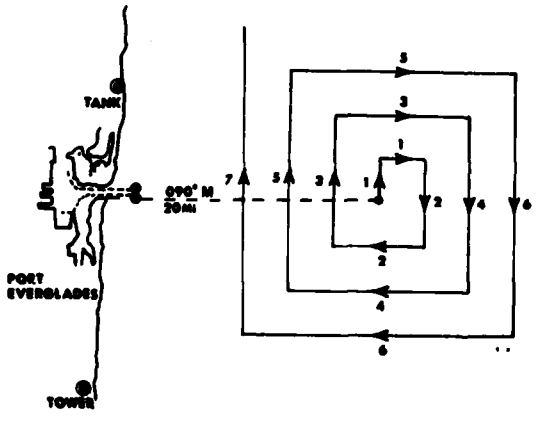


FIGURE 2-10 Square Single Unit

EXAMPLE:

The track spacing is 3 miles and the search speed is 12 knots.

a. To determine the length of the second southerly leg, first determine the length of the basic search leg from Figure 2-10. This value is 4. Multiply 4 by the 3 mile track spacing. Therefore, the length of the actual search leg is 12 miles.

b. To determine the time required to complete this search leg, enter Figure 2-11 with a track spacing of 3 miles and a search speed of 12 knots. The value obtained from the table is 15 minutes. Multiply this number by 4, obtained from Figure 2-10. The result is 60. Therefore, it will take 60 minutes to complete that leg.

	SPEED								
Track Spacing	*1KT*	*2KT*	*4KT*	*6KT*	*8KT*	*10KT*	*12KT*	*14KT*	*16KT*
0.5	30:00	15:00	7:30	5:00	3:45	3:00	2:30	2:09	1:52
1.0	60:00	30:00	15:00	10:00	7:30	6:00	5:00	4:17	3:45
1.5	90:00	45:00	12:30	15:00	11:15	9:00	7:30	6:26	5:38
2.0		60:00	30:00	20:00	15:00	12:00	10:00	8:34	7:30
2.5		75:00	37:00	25:00	18:45	15:00	12:30	10:43	9:22
3.0		90:00	45:00	30:00	22:30	18:00	15:00	12:51	11:15
3.5			52:30	35:00	26:15	21:00	17:30	15:00	13:08
4.0			60:00	40:00	30:00	24:00	20:00	17:09	15:00
4.5			67:30	45:00	33:45	27:00	22:30	19:17	16:52
5.0			75:00	50:00	37:30	30:00	25:00	21:26	18:45
5.5			12:30	55:00	41:15	33:00	27:30	23:34	20:38
6.0			90:00	60:00	45:00	36:00	30:00	25:43	22:30
6.5				65:00	48:45	39:00	32:30	27:51	24:22
7.0				70:00	52:30	42:00	35:00	30:00	26:15
7.5				75:00	56:15	45:00	37:30	32:09	28:08
8.0				80:00	60:00	48:00	40:00	34:17	30:00

ALL TIMES IN MINUTES AND SECONDS

FIGURE 2-11 Square Pattern Computation Table

2. Sector Search Patterns

These patterns are used when datum is established within close limits and the area to be searched is not extensive. The pattern resembles the spokes of a wheel and covers a circular search area. Datum is located at the center of the wheel and should be marked with a box or some other floating marker. By marking datum, the coxswain has a check on his navigation each time the boat passes through the center of the search area. The search unit passes through datum many times, each time increasing the chances of finding the search object. While there are many types of sector search patterns, one simple sector pattern is used for small boats. This pattern consists of six sectors. It is made up of three equilateral triangles with one corner of each triangle in the center of the search area (at datum). Refer to Figure 2-12. Notice that the search radius is also the length of the crossleg. The track spacing varies from zero at datum to a maximum equal to the search radius at the end of each search leg. This simple sector search pattern can be used in both single unit and multi-unit searches.

(a) Sector Search Single Unit—Victor Sierra (VS). The VS pattern is used by a single boat. The first leg of the search should normally be in the direction of search object's drift. If this is not practical, then another direction for the first leg can be used. However, no matter what direction is selected for the first leg, all turns in this pattern are 120° to the right. All legs of the search pattern are equal to the chosen search radius. Upon completion of the search pattern, a second pattern is started with the heading of the new first leg 30° to the right of the final course of the first pattern. (See Figure 2-12).

For example, if a search is ordered with a one mile radius, and the target drift is North, the SRU will start the search by going North for one mile then turning right to course 120° and continue for one mile, then turn right to course 240° for one mile to datum and continuing on course 240° for another mile, then turn right to course 000° for one mile, then turn right to course 120° for two miles (one mile to datum and one mile beyond), then turn right to course 240° for one mile, then turn right to course 000° for one mile. The search unit is now back at datum. If a second search is ordered, the search unit begins the first leg on a course of 030°, with all turns still being 120° to the right.

b. Sector Search Multi-Unit—Victor Mike (VM). The VM pattern is used when a second boat is available. The second boat commences its pattern at datum and starts its search in a direction 90° to the left of the first leg of the first

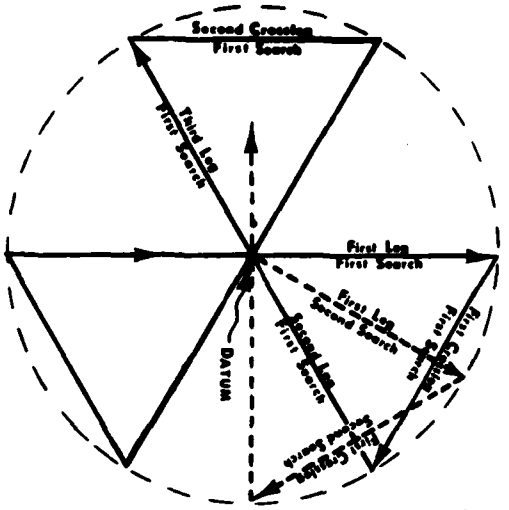


FIGURE 2-12 Sector Search Pattern Single Unit

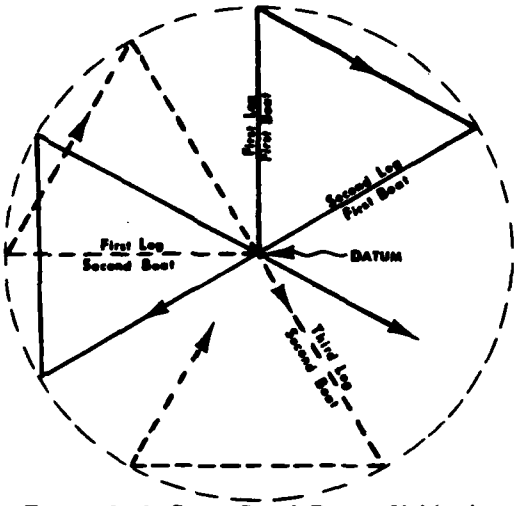


FIGURE 2-13 Sector Search Pattern Multi-unit

boat. If the second boat arrives at datum at the same time as the first boat, the second boat starts its search at a lower speed than the first. When the first boat is about one leg ahead of the second boat, the second boat accelerates to search speed. This slow start by the second boat will keep boats from arriving at the center of the search pattern at the same time. When both have completed one VM pattern the coverage will be the same as if a single boat had completed two VS patterns. When more than two boats are available, the sector search pattern becomes too complicated and a PM search pattern should be used or the search area should be broken into smaller areas and single unit searches conducted.

To determine the distance traveled in one complete search multiply the radius (R) by nine.

$$\text{Total Trackline Miles} = 9R$$

To determine the Total Time (T) for a search multiple the time (t) from Figure 2-14 for one leg by nine.

$$T = 9t$$

To determine Total Area (A) covered in a search multiply the radius (R) by itself, then multiply Pi (π) by the resultant.

$$A = \pi R^2 \qquad \pi = 3.14$$

SPEED

Radius	*3KT*	*5KT*	*8KT*	*10KT*	*12KT*	*15KT*	*18KT*
0.5	10:00	6:00	5:45	3:00	2:30	2:00	1:40
1.0	20:00	12:00	7:30	6:00	5:00	4:00	3:20
1.5	30:00	18:00	11:15	9:00	7:30	6:00	5:00
2.0	40:00	24:00	15:00	12:00	10:00	8:00	6:40
2.5	50:00	30:00	18:45	15:00	12:30	10:00	8:20
3.0	60:00	36:00	22:30	18:00	15:00	12:00	10:00
3.5		42:00	26:15	21:00	17:30	14:00	11:40
4.0		48:00	30:00	24:00	20:00	16:00	13:20
4.5		54:00	33:45	27:00	22:30	18:00	15:00
5.0		60:00	37:30	30:00	25:00	20:00	16:40

Time to compete one leg (t) in minutes and seconds

FIGURE 2-14 Sector Search Computation Table

3. Parallel Track Patterns

Parallel track patterns are used when there is an equal probability the target could be anywhere in the search area. This pattern can be used by one boat or a group of boats. These are the simplest of patterns. The coxswain simply steers straight courses or legs, each leg being one track spacing from the other. The legs are parallel to the long side of the seach area.

a. Parallel Track Pattern Single Unit—Papa Sierra (PS). This pattern is conducted by a single boat as shown in Figure 2-15.

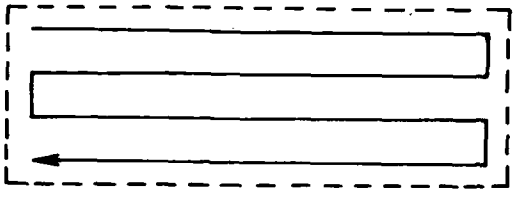


FIGURE 2-15 Parallel Track Pattern—Single Unit

b. Parallel Track Multi-Unit—Papa Mike (PM). This search is based on the same principle as the PS pattern except that more than one boat are searching in line abreast one track spacing apart. It is particularly useful when a number of fishing boats or pleasure craft are available for searching an area and can be instructed what to do by radio. Figure 2-16 illustrates this pattern.

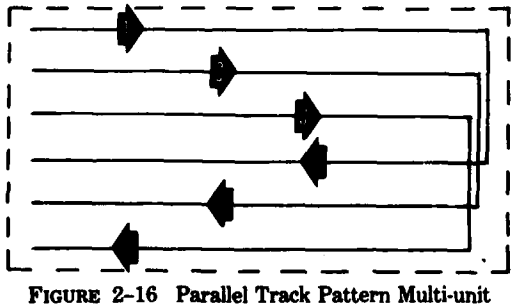


FIGURE 2-16 Parallel Track Pattern Multi-unit

4. Creeping Line Pattern Single Unit—Charlie Sierra (CS)

This is the same type of search as the Parallel Track Pattern (PS) except that the legs are parallel to the short side of the search area. This pattern would be used when there is a stronger probability that the target is in one end of the area than the other. The SAR unit begins the pattern at the end of the area where the target is most likely to be located.

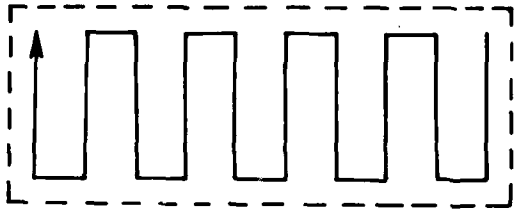


FIGURE 2-17 Creeping Line Pattern—Single Unit

5. Trackline Single Unit Return—Tango Sierra Romeo (TSR)

This search is used to search a track or bearing. On the outbound track search at one half track spacing to one side of the bearing or track, and on the return track search at a distance of one half track spacing on the other side of the bearing or track.

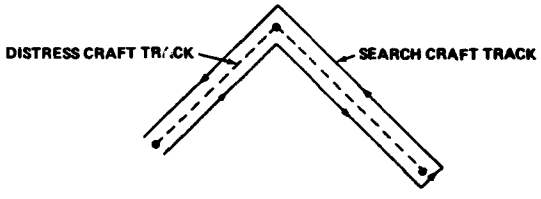


FIGURE 2-18 Track Crawl Pattern Single Unit Return

6. Barrier Search Single Unit Back-and-Forth (XSB)—Xray Sierra

This search is used in an area where a strong current exists. The search area would lie along the current's path. As shown in the illustration the current carries the water past the search barrier. In this pattern the area is moving past the boat rather than the boat moving through the area. Track spacing is not a consideration since a relative plot of the boat's track produces non-parallel legs.

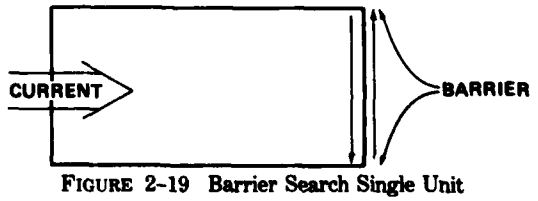
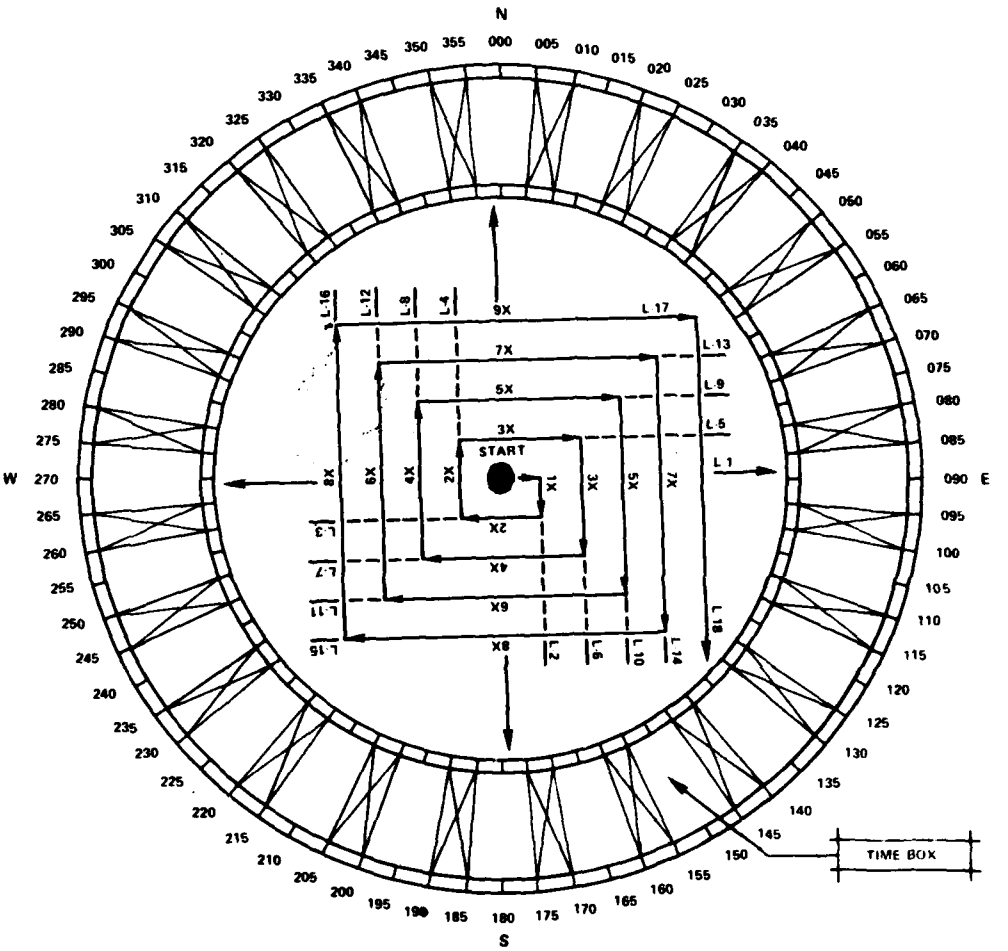


FIGURE 2-19 Barrier Search Single Unit Back-and-Forth

0265 Course and Leg Identifier

A Course and Leg Identifier (Figures 2-20 & 2-21) has been issued to SAR boats for easy calculation of courses to be steered and time on each leg for Square and Sector search patterns. These are self explanatory. They should be carried in each SAR boat.



COURSE AND LEG IDENTIFIER FOR EXPANDING SQUARE PATTERN – (S S)

TIME AND DISTANCE TABLE

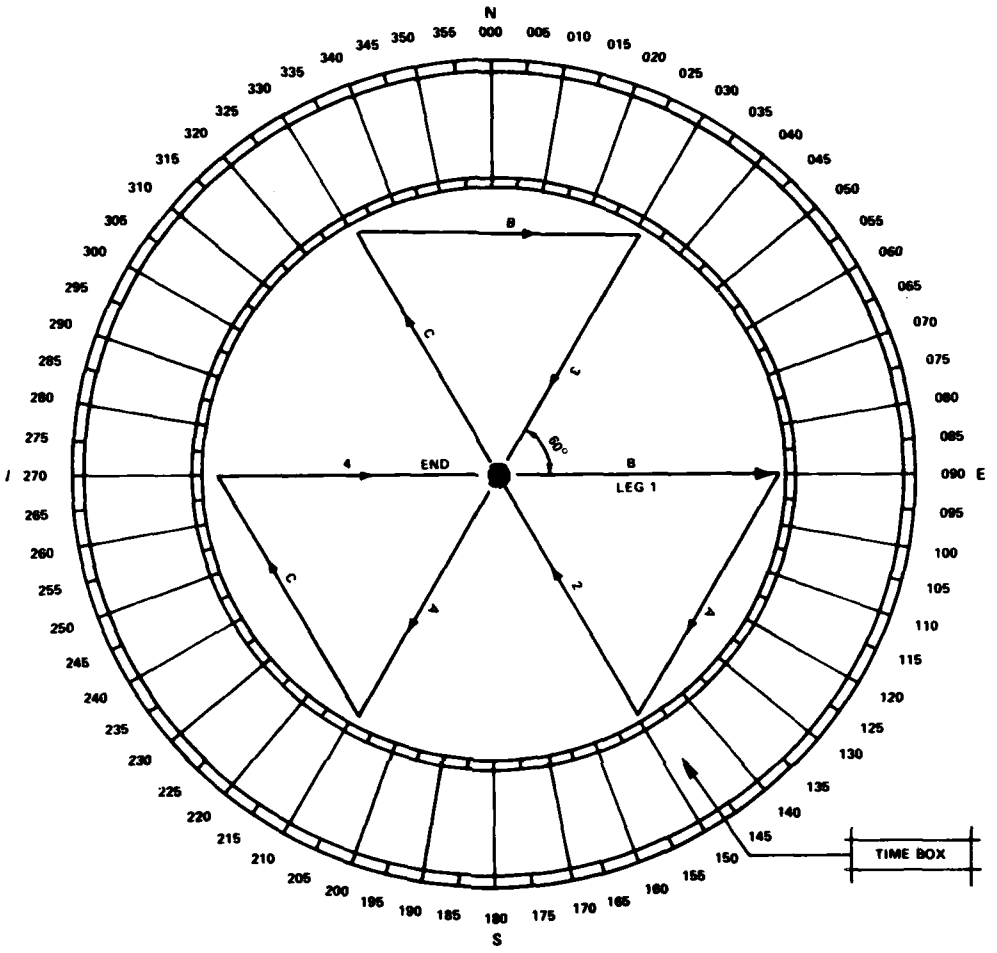
SPEED

NAUTICAL MILES	5Kts M:S	8Kts M:S	10Kts M:S	12Kts M:S	15Kts M:S	18Kts M:S	20Kts M:S
.5	6:00	3:45	3:00	2:30	2:00	1:40	1:30
1	12:00	7:30	6:00	5:00	4:00	3:20	3:00
1.5	18:00	11:15	9:00	7:30	6:00	5:00	4:30
2	24:00	15:00	12:00	10:00	8:00	6:40	6:00
2.5	30:00	18:45	15:00	12:30	10:00	8:20	7:30
3	36:00	22:30	18:00	15:00	12:00	10:00	9:00
3.5	42:00	26:15	21:00	17:30	14:00	11:40	10:30
4	48:00	30:00	24:00	20:00	16:00	13:20	12:00
4.5	54:00	33:45	27:00	22:30	18:00	15:00	13:30
5	60:00	37:30	30:00	25:00	20:00	16:40	15:00
5.5		41:15	33:00	27:30	22:00	18:20	16:30
6		45:00	36:00	30:00	24:00	20:00	18:00
6.5		48:45	39:00	32:30	26:00	21:40	19:30
7		52:30	42:00	35:00	28:00	23:20	21:00
7.5		56:15	45:00	37:30	30:00	25:00	22:30
8			48:00	40:00	32:00	26:40	24:00
	M:S	M:S	M:S	M:S	M:S	M:S	M:S

M - MINUTES
S - SECONDS

1. PLACE INDEX (ARROW NUMBER 1) ON HEADING OF FIRST SEARCH LEG. HEADINGS OF ALL LEGS ARE SHOWN BY THE CORRESPONDING PARALLEL INDEX ARROWS.
2. RECORD TIME TO TURN IN THE TIME BOX FOR EACH LEG. LEG NUMBERS ARE SHOWN ON LEG EXTENSION LINES.

FIGURE 2-20 Course and Leg Identifier Square Search Pattern



COURSE AND LEG IDENTIFIER FOR SECTOR SEARCH PATTERNS–(VS)–60° CENTRAL ANGLES

TIME AND DISTANCE TABLE

SPEED

NAUTICAL MILES	5Kts	8Kts	10Kts	12Kts	15Kts	18Kts	20Kts
	M:S	M:S	M:S	M:S	M:S	M:S	M:S
.5	6:00	3:45	3:00	2:30	2:00	1:40	1:30
1	12:00	7:30	6:00	5:00	4:00	3:20	3:00
1.5	18:00	11:15	9:00	7:30	6:00	5:00	4:30
2	24:00	15:00	12:00	10:00	8:00	6:40	6:00
2.5	30:00	18:45	15:00	12:30	10:00	8:20	7:30
3	36:00	22:30	18:00	15:00	12:00	10:00	9:00
3.5	42:00	26:15	21:00	17:30	14:00	11:40	10:30
4	48:00	30:00	24:00	20:00	16:00	13:20	12:00
4.5	54:00	33:45	27:00	22:30	18:00	15:00	13:30
5	60:00	37:30	30:00	25:00	20:00	16:40	15:00
5.5		41:15	33:00	27:30	22:00	18:20	16:30
6		45:00	36:00	30:00	24:00	20:00	18:00
6.5		48:45	39:00	32:30	26:00	21:40	19:30
7		52:30	42:00	35:00	28:00	23:20	21:00
7.5		56:15	45:00	37:30	30:00	25:00	22:30
8			48:00	40:00	32:00	26:40	24:00
	M:S	M:S	M:S	M:S	M:S	M:S	M:S

M - MINUTES
S - SECONDS

1. PLACE LEG NUMBER 1 INDEX ON HEADINGS OF FIRST SEARCH LEG.
2. THE LETTERS ON THE CROSS LEGS INDICATE THE NUMBERS PARALLEL RADIAL LEG FOR DETERMINING EACH CROSS LEG HEADING.

FIGURE 2-21 Course and Leg Identifier Sector Search Pattern

APPENDIX A
TO
SECTION 2
DESIGNATION OF SEARCH AREAS

Search areas are designated by one of the following methods:

1. Corner Method.

In this method the latitude and longitude (or geographic features) of each corner of the search area are given. For example: 38-00N 66-00W, 38-00N 64-00W, 37-20N 64-00W, 37-20N 66-00W.

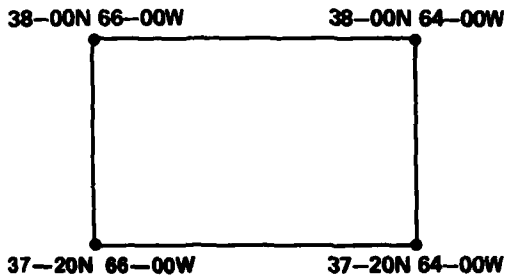


FIGURE 2-22 Corner Method

2. Boundary Method.

In this method the sides of the search area are orientated North/South and East/West and the latitude and longitude of the sides are given. For example: 37-20N to 38-00N and 64-00W to 66-00W.

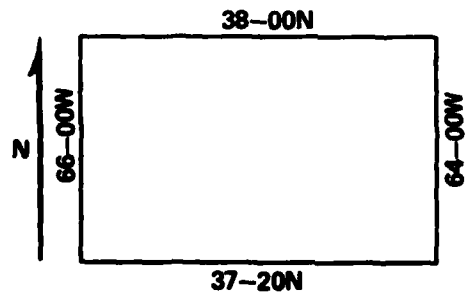


FIGURE 2-23 Boundary Method

3. Trackline Method.

The latitude and longitude of the departure point, turn points and destination point are given with a specific width along the track. For example: Search trackline 44-30N 72-20W to 44-35N 72-15W to 44-29W 72-05W, width 5 miles.

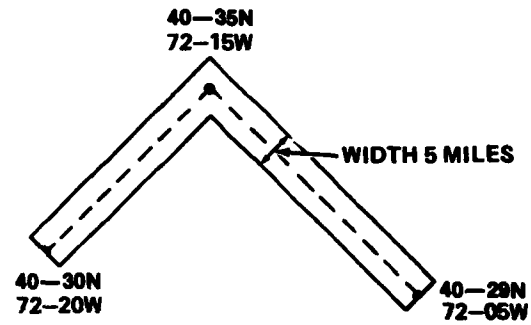


FIGURE 2-24 Trackline Method

4. Center Point Method.

a. Circular Area—The latitude and longitude of the datum are given and a radius around the datum. For example: Datum 44-30N 72-20W. Radius 3 miles.

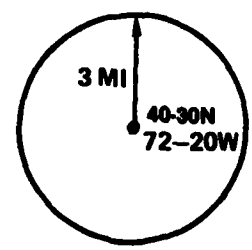


FIGURE 2-25 Circular Area—Center Point Method

b. Rectangular Area—The latitude and longitude of datum are given with the direction of the major (longer) axis and length and width of the area. For example: Datum 44-30N 72-20W, major axis 060°T, 20 miles by 12 miles.

NOTE.—The center point, or datum, may also be designated by a bearing and distance from a geographic landmark. For example: Datum bears 0600T, at 10 miles from Port Everglades South Jetty light, major axis 000°T, 6 miles by 6 miles.

5. Landmark Boundaries Method.

Two or more landmarks are given as boundaries of the search area along a shoreline. For example: Search area from Port Everglades South Jetty, south to the Tower to 10 miles offshore.

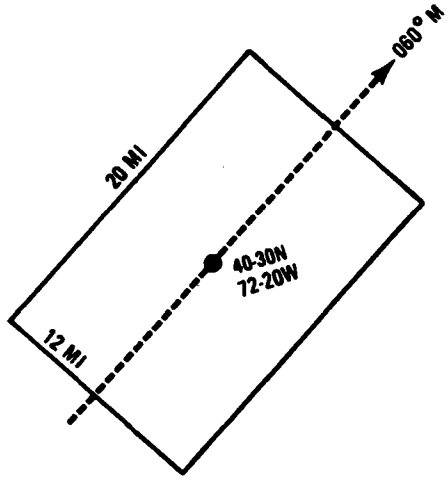


FIGURE 2-26 Rectangular Area—Center Point Method, Latitude and Longitude

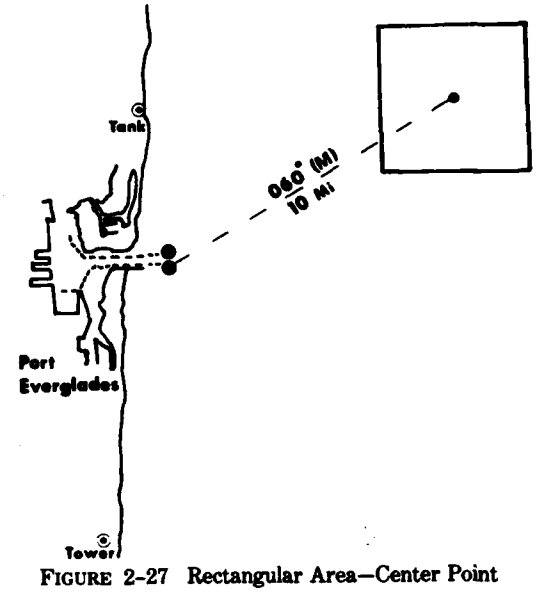


FIGURE 2-27 Rectangular Area—Center Point Method, Bearing and Distance

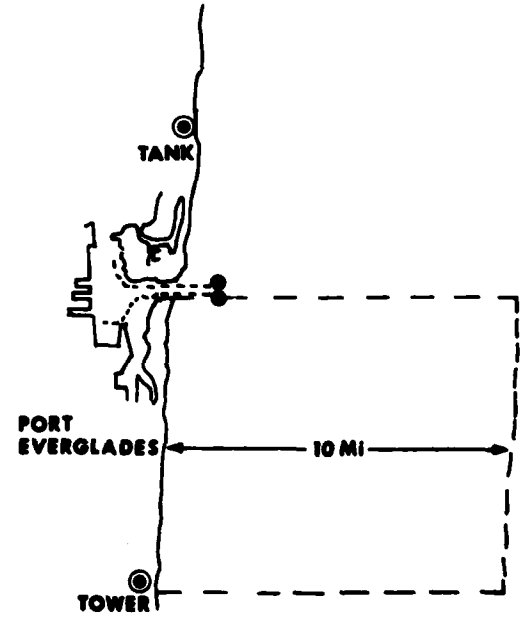


FIGURE 2-28 Landmark Boundaries Method

LIST OF EFFECTIVE PAGES

Subject Matter	Page Numbers	Effective Pages
Title Page	i (Reverse Blank)	Original
Letter of Promulgation	iii thru iv	CH-9
Record of Changes	v (Reverse Blank)	Original
Contents	vii	CH-13
Contents	viii	CH-13
Contents	ix (Reverse Blank)	CH-13
Section 1	1-1 thru 1-4	CH-7
Section 1	1-5	CH-11
Section 1	1-6	CH-12
Section 1	1-7 thru 1-8	CH-11
Section 1	1-9 (Reverse Blank)	CH-12
Section 2	2-1 thru 2-14	CH-13
Section 3	3-1 thru 3-4	CH-11
Section 4	4-1 (Reverse Blank)	Original
Section 5	5-1 thru 5-2	CH-11
Section 5	5-3	CH-12
Section 5	5-4	CH-11
Section 6	6-1 thru 6-4	CH-10
Section 7	7-1 (Reverse Blank)	CH-9
Section 8	8-1 (Reverse Blank)	Original
Section 9	9-1 thru 9-11 (Reverse Blank)	CH-5
Section 10	10-1	CH-8
Section 10	10-2	CH-12
Section 10	10-3 thru 10-4	CH-8
Section 11	11-1	CH-11
Section 11	11-2 thru 11-9 (Reverse Blank)	CH-12
List of Effective Pages	LEP-1 (Reverse Blank)	CH-13

AD-A081 425 COAST GUARD WASHINGTON DC F/G 6/7
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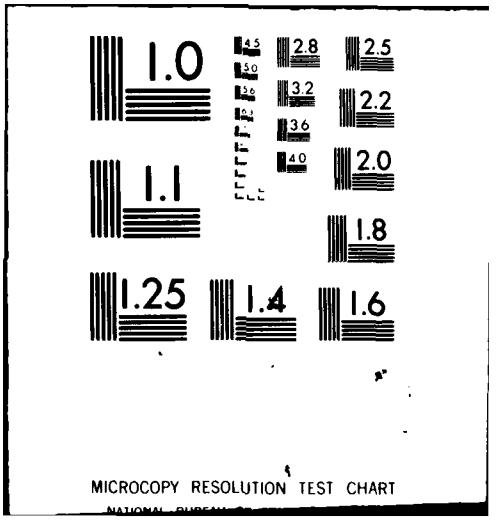
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MICROCOPY RESOLUTION TEST CHART

SUPPLEMENTARY

INFORMATION

50272-101

AD-A 081425

REPORT DOCUMENTATION PAGE	1. REPORT NO. CG- G-OSR-4-81	2.	3. Recipient's Accession No.
4. Title and Subtitle: Addendum to the National Search and Rescue Manual Change 14			5. Report Date 6.
7. Author(s)			8. Performing Organization Rept. No.
9. Performing Organization Name and Address: Department of Transportation U.S. COAST GUARD (G-OSR) 2100 2nd St., SW Washington DC 20593 Ph (202) 426-1933			10. Project/Task/Work Unit No. 11. Contract(C) or Grant(G) No. (C) (G)
12. Sponsoring Organization Name and Address: Same as 9			13. Type of Report & Period Covered 14.

15. Supplementary Notes

This change goes with AD A 081425

16. Abstract (Limit: 200 words)

This publication supplements the National Search and Rescue Manual by providing those procedures which are intended for Coast Guard use.

Change 14 covers the following areas:

a. procedures for deploying datum marker buoys (DMB)

b. use of PFD lights during night time towing operations

c. procedures for attaching underwater acoustic beacons to overturnde ships in certain SAR cases.

17. Document Analysis a. Descriptors

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement: Approved for public release, distribution unlimited	19. Security Class (This Report) UNCLASSIFIED	21. No. of Pages
	20. Security Class (This Page) UNCLASSIFIED	22. Price

(See ANSI-Z39.18) See Instructions on Reverse OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
Commandant (G-OSR-4)
U. S. Coast Guard
Washington, D.C. 20593
(202) 426-1933

COMDTNOTE 16130
SEP 21 1981
NOV 21 1982

COMMANDANT NOTICE 16130 Cancelled:

Subj: CH-14 to USCG Addendum to National SAR Manual (COMDTINST M16130.2)

1. PURPOSE. This notice provides a change to subject addendum.

2. DISCUSSION. This change provides the following revisions:

   a. Promulgates a revised procedure for deploying datum marker buoys.

   b. Directs the use of PFD lights during night time towing operations.

   c. Promulgates procedures for attaching underwater acoustic beacons to overturned hulls in certain SAR cases.

3. ACTION.

   a. Remove pages from the Addendum (salmon colored pages) and replace them with the enclosed replacement pages as shown below:

Remove Pages	Insert Change No. 14 Pages
ix (Reverse Blank)	ix (Reverse Blank)
1-1 thru 1-2	1-1 thru 1-2
3-3 thru 3-4	3-3 thru 3-4
9-1 thru 9-5	9-1 thru 9-5
LEP-1	LEP-1

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	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
A	3		3	3	3	3	3	3	1	1	1	1	2	1							1	2				
B		4	25	1	79		75	2		*	3	26		177	2		1			3						
C	10	5		1*	1		1		1*		1	1		1	1	1	1	1						1	1	
D	*	1		1	1							1	2*						2		1				1	
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List CG-42A

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3. b. Check the list of effective pages.

c. Make an entry in the Record of Changes.

D. C. THOMPSON
Chief, Office of Operations

Encl: (1) CH-14 to USCG Addendum to National SAR Manual (COMDTINST M16130.2).

TABLE OF CONTENTS—*Continued*

Section 1. AERIAL DELIVERY PROCEDURES

0100 Aerial Delivery Procedures, General Considerations

The standard procedures for aerial delivery contained in this section apply to Coast Guard day and night SAR operations over water, and if the need arises, for operations over land. Mobility of personnel on the land generally makes possible the recovery of equipment dropped some distance away, but air drops to survivors at sea require a high degree of accuracy. The patterns described in this section were developed to eliminate as many variables as possible. Thorough training of SAR aircrews in the use of these procedures is required. Aircraft commanders may deviate from these procedures when such action will more effectively accomplish the mission.

0105 Aerial Delivery Operations by Fixed Wing Aircraft

Prior to commencing the patterns, complete the applicable aircraft descent and landing check lists, except as follows:

HC-130—Landing gear up, flaps 50%,
HU-16—Landing gear up, flaps 15 degrees, 2300 RPM.

If an aborted drop or delay is necessary, execute another full pattern prior to making the drop. The aircraft commander must thoroughly brief his crew prior to commencing the drop pattern. A trail line assembly shall be utilized on all free fall drops over water.

The minimum drop pattern altitude shall be 200 feet above the surface except when a higher altitude is necessary to provide adequate clearance over obstacles. In the absence of a firm visual reference and accurate altitude information, the minimum pattern altitude shall be increased as necessary to insure safe flight. Under daytime VFR, and non-glassy water conditions, free-fall drops may be made at an altitude not less than 50 feet above the surface at the discretion of the aircraft commander. Standard pattern airspeed shall be:

HC-130—130 knots IAS or 1.3 Vs, whichever is greater.

HU-16—105 knots IAS or 1.3 Vs, whichever is greater.

0110 Sea Rescue Kit Delivery Pattern (See Figure 1)

The drop course is perpendicular to the wind line. If the survivors are in a raft, the sea rescue kit should be dropped downwind since the survivors' raft will drift faster. If the survivors are in the water, the sea rescue kit should be dropped upwind since the kit will drift faster than the survivors. After determining whether to drop upwind or downwind of the target, maneuver the aircraft on the reciprocal of the drop heading to pass approximately 50 feet abeam of the target. Three seconds after passing the target, drop a drift signal. Continue heading for 15 seconds and drop a second drift signal; then make a 40 degree standard rate turn to the right. After 15 seconds, make a standard rate 180 degree turn to the left, maintain heading until final turn to the drop heading so as to pass approximately 50 feet upwind of the target for upwind drop, or 50 feet downwind for downwind drop. For upwind drops, with surface winds in excess of 15 knots, increase upwind distance 25 feet for each additional 10 knots of wind. After rolling out on final heading, advise dropmaster, THIRTY SECONDS STANDBY. When abeam second drift signal dropped advise the dropmaster, FIFTEEN SECONDS STANDBY. When directly upwind (or downwind) of the first drift signal, advise the dropmaster, DROP. If for any reason drop can not be made, remain silent, add power, and go around. The addition of climb power cancels

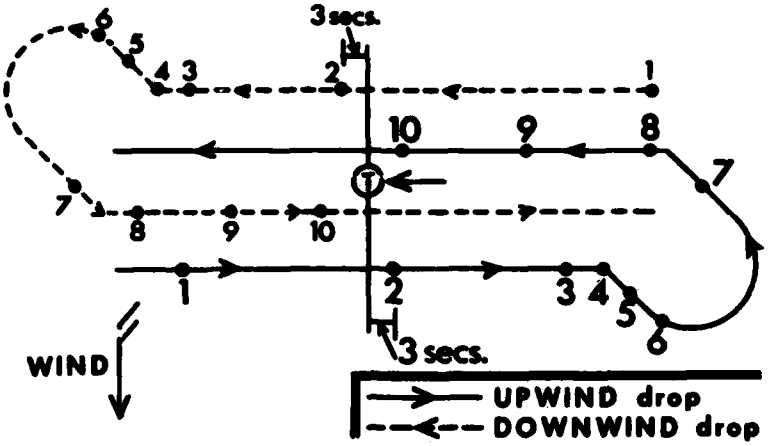

FIGURE 1

STANDARD DROP PATTERN FOR SEA RESCUE KIT

1. Maneuver aircraft crosswind on reciprocal of drop heading.
2. Three seconds after passing abeam target, drop first drift signal.
3. Maintain heading for 15 seconds and drop second drift signal.
4. Turn right 40 degrees.
5. Maintain heading for 15 seconds.
6. Make 180 degree left standard rate turn.
7. Maintain head until final turn to pass proper distance from target.
8. Advise THIRTY SECONDS STANDBY.
9. Advise FIFTEEN SECONDS STANDBY.
10. Command DROP when directly abeam first drift signal.

the run, and this must be clearly understood by all hands.

0115 Free Fall Delivery Pattern (See Figure 2)

Maneuver the aircraft to pass directly over the target into the wind. When over the target make a 180 degree standard rate turn to the left, fly downwind for 30 seconds and make another 180 degree standard rate turn to the left rolling out of the turn directly downwind from the target and advise the dropmaster, THIRTY SECONDS STANDBY. When approximately 15 seconds from the target advise the dropmaster, FIFTEEN SECONDS STANDBY. At drop point, advise the dropmaster, DROP. If for any reason the drop can not be made, remain silent, add power, and go around. To drop downwind of target, pattern should still be flown into the wind but the drop made earlier.

The use of a trail line assembly when delivering free fall equipment is highly recommeded. However, DO NOT STREAM THE TRAIL LINE because either personnel injury or damage to the aircraft/drop equipment could result when the two sea anchors/drogues from the assembly enter the wind stream and deploy.

0120 Dropping Datum Marker Buoys (MB-1 BW)

Before dropping ensure that the stabilizing ribbon streamer is attached to the datum marker buoy (MB-1 BW). These DMBs shall be dropped in accordance with the manufacturer's instructions found on the DMB and within either of the following flight envelopes:

a. Below 100 feet and less than 40 kts or

b. Above 500 feet and less than 150 kts.

the district commander may modify the policy of paragraph 0320 to provide for refloating a grounded boat which is not in peril of further damage or loss if:

a. the Coast Guard units are capable of rendering the assistance;

b. the owner requests the assistance and agrees to the specific effort to be made; and

c. Coast Guard units and personnel are not unduly hazarded by the operation.

Occasionally an operator will insist that the Coast Guard take action, such as pulling a vessel from a reef, that the Coast Guard personnel on scene consider unwise. The Coast Guard is under no obligation to agree to any such request or demand. If a decision to comply with such a request is made, it should be made clear to the operator that he is assuming the risk of the operation and the fact that the action is undertaken at his request against our advice should be logged.

0330 General Procedures when Towing Vessels Under 65 feet in Length

a. *Wearing of Personal Flotation Devices.* Towing is a potentially dangerous evolution, which is often compounded by poor weather conditions and the crossing of breaking bars or inlets. While every effort is made to insure the safety of life and property in all instances, the fact remains that a number of boats each year sink or capsize while under tow by the Coast Guard. Occasionally, loss of life has resulted from these mishaps. Since the wearing of personal flotation devices would reduce the possibility of loss of life during towing operations, vessels under sixty-five (65) feet should normally not be taken in tow until all POB on the towed vessel are wearing approved personal flotation devices. While it is recognized that every towing situation does not warrant the wearing of PFDs, it must be remembered that the safety of the POB and the vessel being towed is in part the responsibility of the boat coxswain and the Coast Guard; therefore, the wearing of PFDs must at least be considered in every towing evolution. In cases where insufficient personal flotation devices are available, Coast Guard personal flotation devices, in excess of crew requirements on the assisting unit(s), should be furnished for those persons in need of them. In addition, if any portion of the tow will take place during darkness, PFD lights should be provided if not already on board the towed vessel. At no time should the stricken vessel be left in immediate danger while waiting for personnel aboard to don their personal flotation devices. If there are insufficient personal flotation devices to go around, do not wait for more to arrive before rendering assistance. Priority consideration upon arriving at the distress scene is: removing the vessel and occupants from immediate danger, then getting all personnel into personal flotation devices as soon as possible. It is stressed that only the wearable types of personal flotation devices fully meet safety requirements; however, other types may be used if not enough wearable PFDs are available.

b. *Removal of Personnel.* When conditions warrant and the opportunity is presented, it is desirable to remove all civilians from the disabled craft, and place a Coast Guardsman aboard. This decision should be made only with the concurrence of the people involved. The determining factor should be the safety of the people and boats involved, considering the hazards of going alongside. Prudence should be exercised to avoid making a bad situation worse. Consideration should be given to the weather conditions and the design of vessel, as well as the physical and psychological state of the POB.

c. *Deck Fittings.* Another hazard in towing small craft involves the poor strength characteristics of cleats and fittings aboard many of today's pleasure craft. Extreme caution should be used in determining the best possible towing procedures by anticipating the strain and stress of the tow. In view of this, consideration must be given to the method of securing the tow line to the boat (e.g., securing the tow line to the stem pad eye which is available on most trailerized small boats, or by rigging a bridle around the towed vessel).

d. *Communications.* Under certain operating conditions involving the towing evolution, it is essential that a system of communication with the towed vessel be established. The coxswain of the towing boat must insure that those he is assisting understand and agree on

a signal to indicate trouble. Ideally, stationing a Coast Guardsman on board with a portable communication rig would insure quick response to urgent situations. As an alternative, most units have portable radios that could be carried on board Coast Guard boats when underway, thereby providing a ready communications resource which could be transferred to a disabled vessel utilizing some type of water-tight enclosure. Directions for use of the radio are on the back of the set. However, the radio could be switched on and preset for working frequency, prior to transfer to the disabled craft in order to insure immediate operation. This procedure would be of particular value during night-time operations. Other methods such as flashing lights, warning flag or rag, hand signals, etc., may also be utilized by the coxswain, depending on the on-scene conditions. It must be remembered that it is incumbent on Coast Guard personnel to learn as much as possible about conditions on the towed vessel, and this information must be continuously updated. Regular checks utilizing the radio or other means of communication are essential elements which will assist in insuring a safe evolution.

e. *Tidal Considerations.* Many of the incidents which resulted in damage to grounded small craft could have been avoided by waiting for a rising tide before attempting to refloat, and by inspecting the hull in some manner to determine if it is water-tight. The fact that certain small craft are left high and dry by receding tide may not cause damage, if suitable preventer lines are rigged to prevent capsizing, or to maintain it upright on the incoming tide.

f. *Unit Training.* All units operating SAR boats must have a SAR Boat Training Program pursuant to COMDTINST M16114.6 (old CG-313. Note that part of this training program is devoted to Seamanship and Safety, and includes towing methods, care, techniques and dangers associated with this operation. A complete program will cover detailed procedures for the towing of vessels or small craft and sailboats, including righting small sailboats.

Section 9. UNDERWATER LOCATION OF CRASHED AIRCRAFT AND CAPSIZED VESSELS CONTAINING TRAPPED PERSONNEL

0900 GENERAL

a. *Crashed aircraft.* Many instances are on record where aircraft downed in moderate to shallow waters have not been found, or excessive time and funds have been expended in determining their locations. This has resulted in degradation or loss of crash evidence. As many of these aircraft could have been located with the help of an installed Underwater Acoustic Beacon ("pinger"), all Coast Guard aircraft have been equipped with the Dukane Model N15F210B "pinger". This "pinger" will provide a sound source in the submerged aircraft which may be detected by surface craft and precisely located by divers through the use of an Underwater Acoustic Locator System. Six of these Locator Systems (Dukane Model N30A5A) have been placed with custodial units which were selected based on the availability of divers (Strike Team) in the CONUS and provision to isolated units for immediate use of the Locator System.

b. *Capsized vessels containing trapped personnel.* There are special circumstances in which it would be desirable to attach an acoustic "pinger" to the hull of an overturned vessel in danger of sinking, to aid in its relocation if it does sink. Although this should not be a routine action for all overturned hulls involved in a SAR case, such action is desirable when it is known or suspected that personnel may be trapped in the hull. In such cases, the OCS should request the SMC to deliver one of the pingers by the most feasible and rapid means available. Sources for obtaining the pingers are:

(1) From an air station or one of the units listed in section 0905. Each of these units has been provided with a spare pinger in its inventory for this purpose.

(2) From a Coast Guard aircraft on scene or at a conveniently located air station. It is contemplated here, that the pinger be removed from the aircraft, and delivered to the overturned hull by whatever means the OSC deems appropriate. The pinger should be replaced in the aircraft from which it was borrowed as soon as possible. A replacement should be obtained from the Coast Guard Aircraft Repair and Supply Center immediately.

0905 Underwater Acoustic Locator Systems

The Underwater Acoustic Locator Systems (Dukane Model N30A5A) are located as follows (1 system/unit):

(1) Atlantic Strike Team
(2) Gulf Strike Team
(3) Pacific Strike Team
(4) Air Station Borinquen
(5) Air Station Barbers Point
(6) Air Station Kodiak

Each custodial unit possessing a Locator System (Dukane Model N30A5A) shall maintain a complete set of Manufacturers Handbook/Technical Manuals on the equipment. An Underwater Crash Location Detail shall be trained and local procedures prepared to insure proper maintenance, testing and operational readiness of the Locator System. Underwater operations shall be conducted by qualified divers.

0910 Locator Equipment Description

a. The Underwater Acoustic Beacon ("pinger") mounted in Coast Guard aircraft is a

FIGURE 21 Dukane Model N15F210B Underwater Acoustic Beacon ("pinger").

Dukane Model N15F210B (Figure 21). The specifications for the beacon are:

Operating Frequency:	37.5 ± 1kHz
Operating Depth:	Surface to 20,000 feet
Pulse Length:	Not less than 9 milliseconds
Pulse Rate:	Not less than .9 pulse/second
Operating Life:	30 days
Operating Temperature:	+20°F to +100°F
Actuation:	Fresh/salt water, surface to 20,000 feet
Radiation Pattern:	Rated output over 80% of sphere
Size:	1.3" diameter x 4" length
Weight:	Less than 9 oz. (12 oz. with mounting kit)

b. The Underwater Acoustic Locator System is the Dukane Model N30A5A (Figure 22), which consists of a Model M15A235A Underwater Acoustic Receiver and accessory items which permit use of the receiver from a small boat or underwater. Pertinent specifications for the receiver are:

Frequency Range:	Continuously tunable from 30 to 45 kHz
Power Source:	Battery, providing in excess of 50 hours of normal operation
Operating Temperature:	0°F to +130°F
Storage Temperature:	−65°F to +140°F
Size:	4.5" diameter x 9" length
Weight:	5 lbs. (in air)

The receiver is a portable transistorized, hand held device. It is designed for use in conjunction with an underwater sound source emitting a signal in the 30–45 kHz range. With a sound source of this type (Dukane "pinger" Model N15F210B for Coast Guard aircraft) attached to submerged hardware, the directional characteristics of the receiver provide rapid bearing determination. The receiving transducer is removable and may be attached to an extendable support rod for use from a boat during preliminary search operations. When the maximum signal area is located, the receiver is reassembled for use by a diver in pin-pointing the "target".

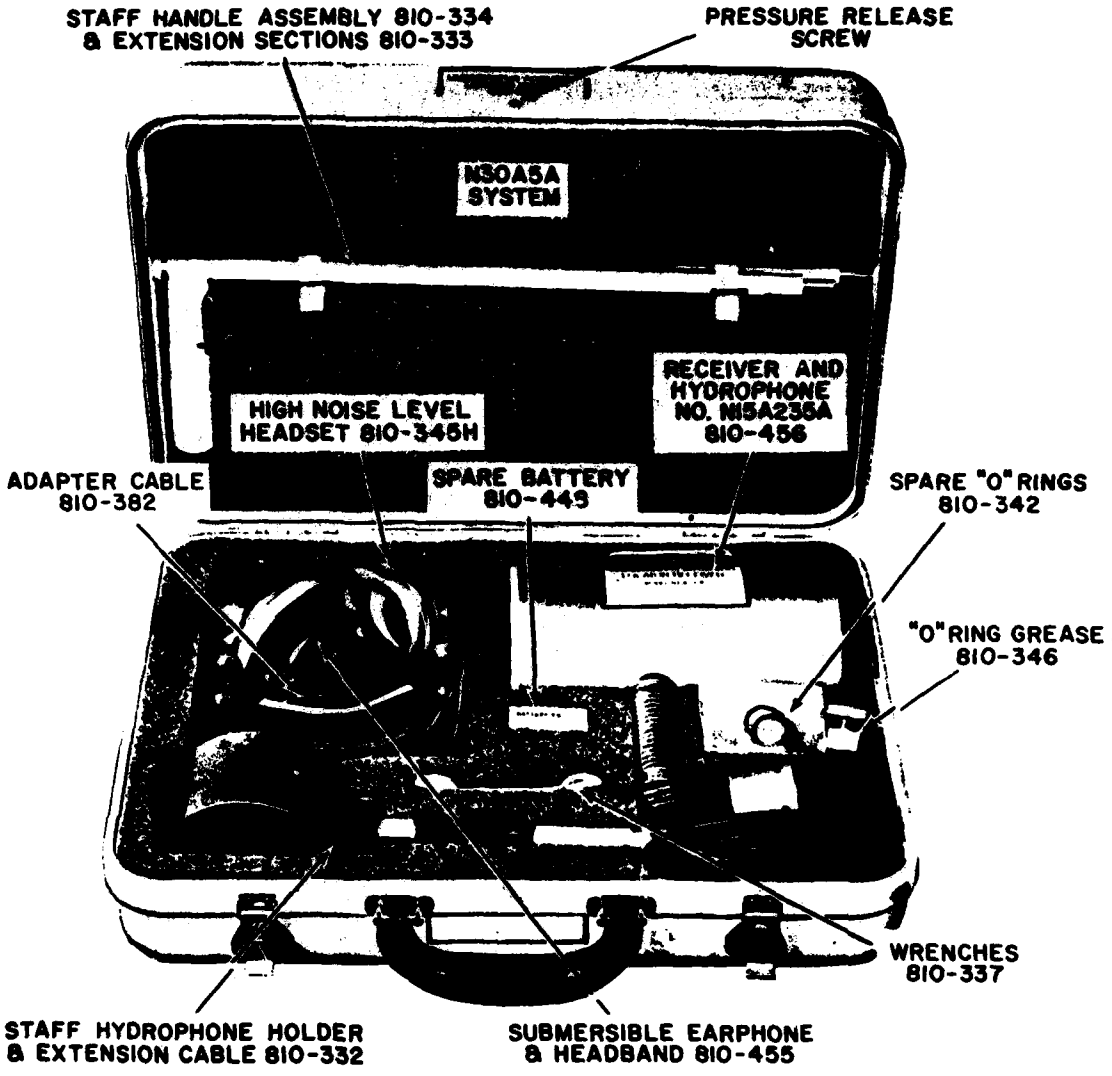

Figure 22 Dukane Model N30A5A Underwater Acoustic Locator System.

0915 Underwater Locating Procedures

The Underwater Crash Location Detail using the Locator System in accordance with these search procedures should insure that the "search" boat is able to accurately plot its position at each listening point, or sufficient buoys must be available to mark the listening points. Unless these points can be plotted/marked it will be extremely difficult to con duct the search pattern adequately. Datum shall be determined in accordance with procedures outlined in Chapter 8 of the basic manual. After datum has been determined and the search plan (Figures 23 thru 26) selected by the SAR Mission Coordinator (SMC), the Under water Crash Location Detail should conduct the acoustic search using the following procedures:

a. *At Datum (Point A)*—On arrival, buoy the spot. Shut down engine. Put receiver hydrophones over the side, and follow procedure specified under *"Detection."* If a signal is detected, immediately proceed as specified under *"Localization."* While making this initial survey, search the water surface with binoculars for floating or awash wreckage. If wreckage is spotted investigate before proceeding.

b. *Establish Listening Point Spacing*—See Figure 27. Drop test beacon, line, and buoy near point A. Get underway and run down the axis (sunken aircraft course) for a distance of one mile. Stop engine. Attempt to detect beacon buoy. If it is heard, proceed another mile and listen again. If it is not heard, reverse course for a half a mile. Listen again. Do this until the effective range of the test beacon is established in the search plan that was specified to be used. Adjust frequency of the receiver for maximum indication at this time and not reference setting. Return and pick up the test beacon. Note: The best spacing to use will be developed in each area by experience.

c. *Search*—Start search in the same direction that the spacing test was conducted (to be sure the sunken craft's beacon had not been heard during the test and an erroneous spacing established). Using the specified search plan and the spacing arrived at, proceed to each listening point in alphabetical sequence. Follow the procedure specified under *"Detection"*. Maintain a visual survey with binoculars. If timed runs are being made between listening points, buoy each point before proceeding. If accurate position location is possible, plot each listening point on the chart.

d. *Detection*—At listening point, with engine stopped, put hydrophone assembly in the water as deep as equipment and boat configuration will allow. Initially rotate slowly 360° with receiver set at reference setting. Repeat in 20° steps, swinging the frequency adjustment through its full range at each step. Repeat this procedure on opposite side of boat to prevent hull masking. Proceed to next listening point if pinging is not heard. If pinging is heard proceed with "Localization."

e. *Localization*—See Figure 28. Having detected pinging, the position must be established and buoyed. Stop the search plan. Rotate hydrophone for loudest signal. Run down this bearing line, stopping at one quarter spacing distances. Verify bearing before proceeding on at each quarter spacing distance. Buoy the position and proceed. Continue until signal bearing is reversed. Then proceed to a point one quarter spacing distance from general localization course. Take another bearing with hydrophones and follow this course. As you cross the line of buoys on the initial general localization course drop a buoy and stop. You should be over the beacon. The beacon will sound like it is coming from all directions when you are over it. Before diver goes in, slowly criss-cross the area with fathometer running (if available). In shallow water large objects will show up. This may reduce divers search time. Anchor and stop engines before putting diver in the water.

f. *Final Approach*—If sunken craft can be seen, the divers immediately check for life or body recovery. If it cannot be seen, the receiver is converted for diver use. The diver

swims to the bottom, but not to exceed authorized diving limits. On the bottom, the beacon signal may be directional enough to swim up to within a few feet of it. After location is accomplished, a buoy line should be attached directly to the sunken craft. Divers shall be cautioned to exercise extreme caution if *sensitive or dangerous cargo* is involved.

g. *Salvage* — The On-Scene Commander (OSC) should arrange for the salvage group to take over on the scene. Divers should be transferred from one party to the other, if needed. The Under water Crash Location Detail should be returned and be placed in a state of readiness again. Assistance should be requested to keep area clear of boat and ship traffic, if needed.

h. *Police the Area*—Remove all buoys from the water except the ones immediately around the salvage site. Comply with the appropriate Inland or International Rules for making an underwater obstruction that is hazardous to navigation or in leaving markers.

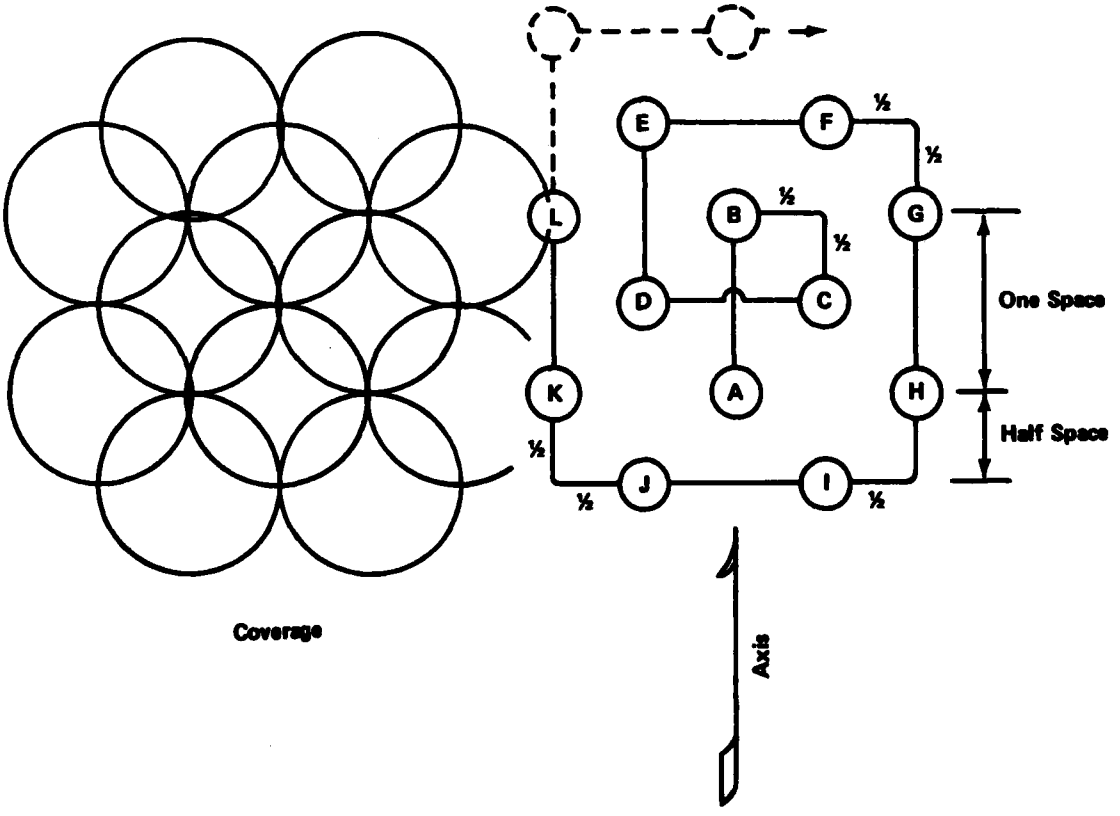

FIGURE 23 Search Pattern No. 1.

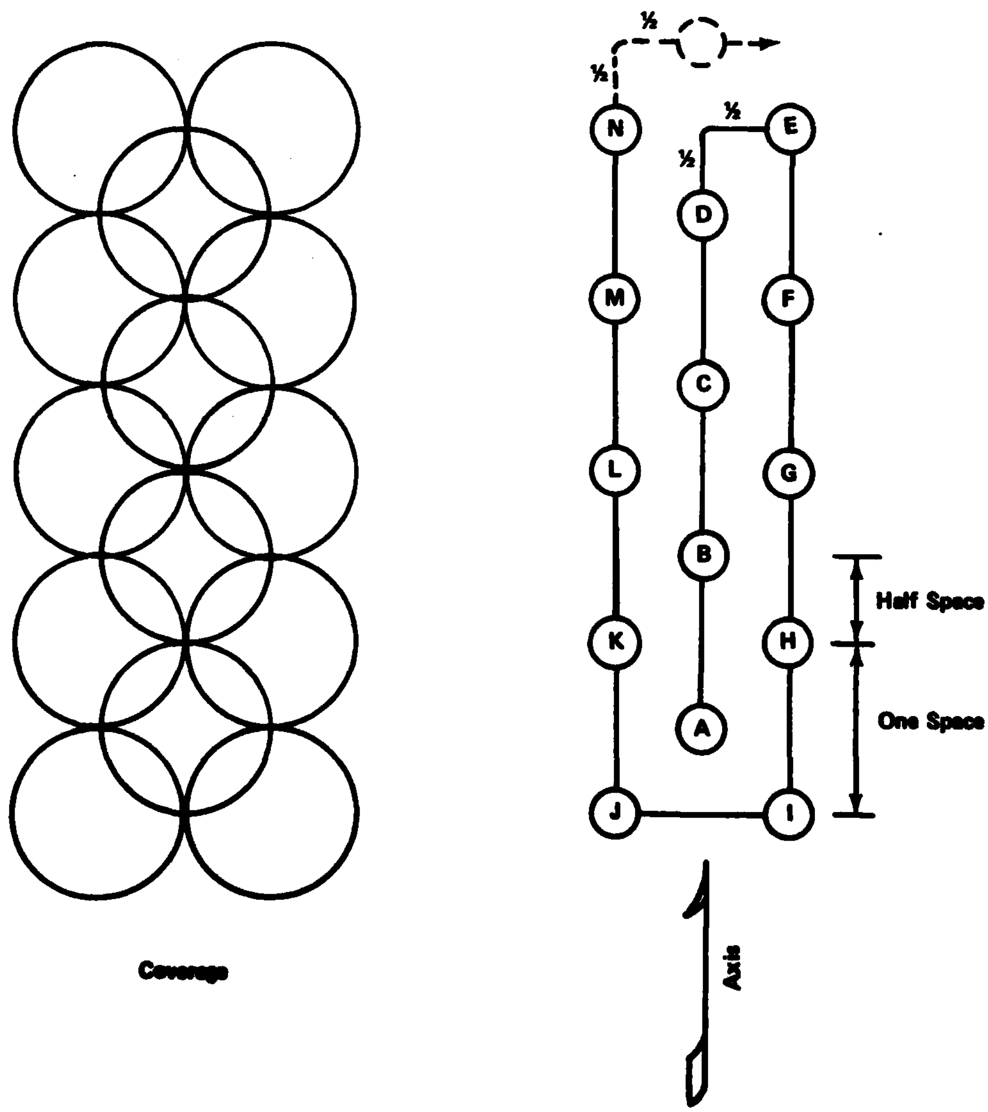

FIGURE 24 Search Pattern No. 2.

LIST OF EFFECTIVE PAGES

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